This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

975,706
A532

The Hopkins Library
presented to the
Leland Stanford Junior University
by Timothy Hopkins.

JOURNAL

OF THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Devoted to Entomology in General.

Volume III, 1895.

EDITED BY WM. BEUTENMÜLLER.

NEW YORK:
PUBLISHED FOR THE SOCIETY
QUARTERLY.
1895.

LELAND STANFORD JUNIOR
LIBRARY
UNIVERSITY.

H. B. 895.

CONTENTS OF VOLUME III.

BANKS, NATHAN,

Notes on the Pseudoscorpionida, ... 1
Two California Phalangids, ... 66
A List of Spiders of Long Island, N. Y., with Descriptions of New Species, ... 76
Some Acarians from a Sphagnum Swamp, ... 128

BEUTENMULLER, WILLIAM,

A Variety of the Larva of Sphinx plebeius, ... 58
Descriptions of the Preparatory Stages of Ennomos alniaria *Linn*, 137
Note on Hyperchiria io, var. lilith, ... 138
Notes on Thecla acadica and Dichelonycha fuscula, . . . 143

CALVERT, PHILIP P.,

The Odonata of New York State, ... 39

CLARK, CHARLES UPSON,

On the Food-Habits of certain Dung and Carrion Beetles, . . 61

COQUILLETT, D. W.,

Notes and Descriptions of Tachinidæ, ... 49
New Genera and Species of Tachinidæ, ... 97

DAVIS, WILLIAM T.,

Insects at Watchougue and Beulah Land, Staten Island, N. Y., . 140

DITMARS, Raymond L.,

On a Collecting Tour in Connecticut, ... 62

DYAR, HARRISON G.,

A Combination of the Two Classifications of Lepidoptera, . 17
Notes on Two Callimorphas, ... 59
Notes on Drepanid Larvæ, ... 66
Larva of Demas propinquilinea; its Systematic Position, . 130
A New Datana, ... 167
Correction of a Misidentification—Attacus splendidus, . . 191

DYAR, HARRISON G.; MORTON, MISS EMILY L.,
The Life-Histories of the New York Slug Caterpillars, . . . 145

GROTE, A. RADCLIFFE,
Note on the Smerinthinæ, ... 132
Final Note on the Platypterygidæ, ... 166
Schrank's Genera 168

LANDER, BENJAMIN,
Domed Burrows of Cicada septendecim 33

LENG, CHARLES W., and BEUTENMULLER, WM.,
Preliminary Hand-book of the Coleoptera of Northeastern America, (continued from Vol. II, p. 190) 73

MORSE, ALBERT P.,
New North American Tettiginæ, ... 14, 107

PACKARD, A. S.,
Life History of Heterocampa obliqua, ... 27
A Clue to the Origin of the Geometrid Moths, ... 30
On the Larvæ of the Hepialidæ, ... 69
The Eversible Repugnatorial Scent Glands of Insects, ... 110
Early Stages of some Bombycine Caterpillars, ... 175

TOWNSEND, C. H. TYLER,
On the Correlation of Habit in the Nemocerous and Brachycerous Diptera between Aquatic and Blood-sucking Adult Females, ... 134

WEBSTER, F. M.,

JOURNAL

OF THE

New York Entomological Society.

Vol. III. MARCH, 1895. No. 1.

NOTES ON THE PSEUDOSCORPIONIDA.

By NATHAN BANKS.

Mr. H. G. Hubbard has lately sent me a large number of interesting Pseudoscorpions from various parts of the United States. Several new species are contained in the collection, which also affords new localities for many known forms. I hope sometime in the future to make a somewhat elaborate work on this interesting group of Arachnida, but I am aware that there are many new forms yet to be discovered in the arid and in the mountainous regions of the west. Therefore I would only give at present a revision of all the forms known to me.

The Pseudoscorpions form a very strongly circumscribed group. Of the general structure of the scorpions, they differ from them in several ways. They have no post-abdomen; there is no longitudinal furrow on the cephalothorax, while transverse ones are frequently present; there is no median pair of eyes; there are no pectines, which perhaps may find their homologue in the spinning organs; and there are some minor differences in the mandibles, legs, etc.

Prof. Luigi Balzan has (in Ann. Soc. Ent. France, 1891) given a new and elaborate classification of the Pseudoscorpions based principally on the South American forms. The principal new point introduced by him, is the value he assigns to the serrula of the mandibles. This, I think, he has much over-estimated; and would put more faith in the sutures of the cephalothorax and in the longitudinal division of the abdominal scutæ. The two main divisions do not differ much in their composition; but *Olpium* and *Atemnus*, which according to Balzan are placed with the Cheliferidæ, I would place in the Obisiidæ. Moreover I have tried to bring the classification into the style of that usually adopted by the best entomologists.

I would consider these Arachnids as representing an order — Pseudoscorpionida; tabulating the genera and other groups as follows:

1 Cephalothorax with a transverse median suture; abdominal scutæ divided; mandibles small, with a stylet, the serrula attached above to the mobile finger; cephalothorax rounded in front; clavate hairs frequently present.......................... (CHELIFERIDÆ) 2
No transverse suture; abdominal scutæ entire; no clavate hairs; cephalothorax usually truncate in front; mandibles usually large; the stylet often lacking, and the serrula usually detached from the mobile finger.................................. (OBISIIDÆ) 4

2 Four eyes; cephalothorax narrowed quite suddenly in front of eyes; no trochantins to the anterior pairs of legs... (GARYPINÆ)..**Garypus.**
Two or no eyes; cephalothorax evenly rounded in front; trochantins to anterior legs.................................. (CHELIFERINÆ) 3

3 Femur of palpus not pedicellate, gradually and slightly enlarged from base to tip; palpi very long and slender; two distinct eyes (except cave-form)..**Chelifer.**
Femur of palpus distinctly pedicellate, suddenly enlarged near base; palpi short and stout; eyes usually wanting..................**Chelanops.**

4 Mandibles with a stylet; mandibles small, cephalothorax rounded in front; the serrula attached above.......................... (OLPIINÆ) 5
Stylet often absent; mandibles large, serrula detached above; cephalothorax truncate in front.............................. (OBISIINÆ) 6

5 Four distinct eyes...**Olpium.**
Two or no eyes...**Atemnus.**

6 Mandibles with a stylet........................... (IDEOBISINI) 7
No stylet present.. 8

7 Four eyes...**Ideobisium.**
Two eyes...**Ideoroncus.**

8 Tibia of palpus chalice-like.......................... (CHTHONINI) 10
Tibia normal.. (OBISINI) 9

3 { Hand much darker than the other part of the palpus.........**muricatus.**
{ Palpi unicolorous.. 4

4 { Tibia longer than cephalothorax plus mandibles, on outer side at base distinctly concave..........................**floridanus.**
{ Tibia not longer than cephalothorax plus mandibles, outer side not concave.. 5

5 { Body red-brown; hand quite thick; larger granules on the cephalothorax..........................**cancroides.**
{ Body pale yellowish; hand more slender; no larger granules on the cephalothorax..........................**biseriatum.**

Chelifer cancroides *Linn.*—Faun. Suec.

This common species probably occurs all over the United States. I have it from Ithaca, N. Y.; Sea Cliff, L. I.; Washington, D. C.; Ohio (C. M. Weed); Ft. Collins, Colo. (Baker); Missouri (G. Van Ingen); Grosse Isle, Detroit River, (Hubbard); Lake Tahoe, Calif., (Hubbard); and Brazos Co., Texas.

Chelifer biseriatum, sp nov.

Length, 2.2 mm. Pale brownish, palpi and anterior part of cephalothorax darker, a black spot at base of cephalothorax; abdomen with two series of brown spots. Cephalothorax as usual; sutures not very distinct, the anterior one curved forward, the posterior one nearly straight; eyes not prominent; no larger granules in either sex; palpi slender; trochanters as usual; femur longer than cephalothorax, gradually enlarged from base to tip; tibia shorter, no thicker and pedicellate, enlarged from near base to tip; hand shorter than tibia, more than twice as long as broad, tapering to the fingers, which are as long as the hand and much curved. Hard parts granulate and with many clavate hairs.

Many adult ♀ and ♂, the former with egg-bunches, beaten from palmetto-fans; Lake Poinsett, Florida, (H. G. Hubbard). Differs from *C. cancroides* in having no larger granules, in the more slender hand, more thickly clothed with clavate hairs, and in the pale color and markings.

Chelifer floridanus *Bks.*—Can. Entom., Aug., 1891.

Southern Florida, (E. A. Schwarz).

Chelifer muricatus *Say.*—Comp. Writings, Leconte Ed.

This easily recognized species tho' not common anywhere, appears to be quite widely distributed in the eastern United States. I have it from Ithaca, N. Y.; Sea Cliff, L. I.; Fredricksburg, Va., (Richardson); Salineville, Ohio, (A. D. MacGillivray); Bee Spring, Ky., (Hubbard); St. Lucie, Fla., and Sand Point, Fla., (Hubbard); Citrus Co, Fla., (C. M. Weed); and Punta Gorda, Fla., (Mrs. A. T. Slosson).

Chelifer scabrisculus *Simon.*—Ann. Soc. Ent. Fr., 1878.

Ch. degeneratus BALZAN, Ann. Soc. Ent. Fr., 1891.

Described from Southern California; I have it from S. Calif. one specimen (Cooper Curtice); Lake Tahoe, Calif., one specimen (Hubbard); Hood's River, Oreg., one specimen (Hubbard); and two specimens under stones, Utah Lake, Utah, (Hubbard), are reddish and have slightly longer fingers, but are hardly different.

Chelifer mirabilis, sp. nov.

Length, 2.6 mm. Cephalothorax and palpi red-brown; abdomen and legs brownish. Cephalothorax rounded, and slightly narrowed near anterior margin; no eyes; sutures distinct; surface finely granulate, no larger granules. Abdomen quite broad, about twice as long as the cephalothorax. Palpi slender; trochanter pedicellate, tubercled above near tip; femur slightly longer than cephalothorax, gradually enlarged from base to near tip, inner margin straight, outer slightly convex; tibia three-fourths as long, and slightly broader than femur, quite long pedicellate, outer margin slightly and evenly convex; inner margin convex at base, then nearly straight; hand about as long as tibia, slightly convex on outer margin, quite strongly and evenly on the inner margin, tapering to the fingers, which are about as long as the hand and quite strongly curved. Short clavate hairs on whole of palpi except fingers; similar ones on rest of body.

Three specimens, Indian Cave, Barren Co., Ky., June, (H. G. Hubbard); two specimens, Cave at Pennington Gap, Va., (H. G. Hubbard). A very peculiar species, particularly on account of the form of the tibia of the palpus, which is quite unlike that of our other species, but somewhat like the European *C. latreillii.*

Chelanops *Nicolet.*

Tömösvary in 1882 (Pseudosc. faun. Hungar.) divided this genus into *Lamprochernes* (those with long and simple hairs on

5	Inner margin of hand not greatly swollen at base	7
	Inner margin of hand very much swollen at base, so that the hand is nearly as broad as long	6
6	Palpi greenish	**latimanus.**
	Palpi nearly black	**virginica.**
7	Fingers a little longer than hand	**tristis.**
	Fingers a little shorter than hand	**morosus.**
8	Inner margin of hand greatly swollen at base	10
	Inner margin of hand but weakly swollen at base	9
9	Palpi pale yellowish	**pallidus, affinis.**
	Palpi, dark red-brown	**sanborni, dorsalis, pallipes.**
10	Florida species	**tumidus.**
	California species	**validus.**
11	Two distinct eyes, hairs clavate	**texanus.**
	No eyes, hairs not clavate	**acuminatus, floridæ, latus.**

Chelanops oblongus *Say.*—Comp. Writings, Leconte Ed.

Chelanops alius LEIDY, Proc. Phil. Acad. Sci., 1877.

Probably in all the eastern United States; I have it from Ithaca, N. Y.; Washington, D. C.; Brazos Co., Texas; Citrus Co., Florida, (C. M. Weed); Sand Point, Fla., (Hubbard); Retreat, N. C., (Hubbard); Fredricksburg, Va., (Richardson); Detroit, Mich., (Hubbard).

Chelanops grossus *Bks.*—Can. Entom., March, 1893.

Quite common in Colorado (Dr. C. F. Baker).

Chelanops texanus *Bks.*

Chelifer texanus BANKS, Can. Entom., Aug. 1891.

Tho' this species has distinct eyes I place it here on the form of the femur. Brazos Co., Texas.

Chelanops acuminatus *Simon.*

Chelifer acuminatus SIMON, Ann. Soc. Ent. Fr., 1878.

California; Olympia, Wash. State, (T. Kincaid).

Chelanops floridæ *Balzan.*

Chernes floridæ BALZAN, Ann. Soc. Ent. Fr., 1891.

Three specimens from Punta Gorda, Fla., (Mrs. Slosson); very close to *C. latus*, but the fingers are shorter, and the tibia more swollen on inner side, and the body more slender.

Chelanops latus *Bks.*—Can. Entom., March, 1893.

Runnymede, Fla.; Palatka, Fla., (Hubbard).

Chelanops dentatus, sp. nov.

Length, 2 mm. Cephalothorax and palpi reddish-brown, abdomen brownish legs pale. Cephalothorax rounded in front, no eyes or eye-spots, mandibles small; abdomen broad, depressed, scutæ divided; palpi short and stout, the trochanter slightly swollen behind, convex in front; the femur shorter than the cephalothorax, pedicellate, about of even width throughout; tibia about as long as femur, a little broader, pedicellate, moderately convex on outer margin, quite strongly swollen on inner margin; claw large, as long as femur plus trochanter, nearly twice as broad as femur, broadest at base and tapering to the fingers, which are as long as the hand and curved; on the inner margin of the hand is a large tooth-like process projecting outward and pointed in front. Body and appendages finely granulate, and with strongly clavate hairs, the usual simple ones on the fingers.

One specimen of this curious species without locality (Hubbard); but probably from Florida. The only similar species is *Ch. armiger* Balzan from Venezuela, which has two projections, one on each side of the hand.

Chelanops latimanus, sp. nov.

Length, 3 mm. Pale greenish, cephalothorax tinged with brownish, two series of brown spots above on the abdomen. Cephalothorax narrowed and rounded in front, two large white eye-spots; abdomen depressed, moderately broad, twice as long as cephalothorax; palpi short and stout, trochanters much swollen above, convex in front; femur much shorter than cephalothorax, short pedicellate, broadest near base, and two and one-half times as long as broad; tibia as long as, but little broader than femur, pedicellate, but little convex on either side; claw about as long as cephalothorax, very broad at base, fully twice as broad as femur, the basal angles but little rounded, then tapering to the fingers, which are stout, but little shorter than the hand, and curved. Hard parts finely granulate, and furnished with short, thick, but not clavate hairs.

One specimen, Punta Gorda, Fla., (Mrs. A. T. Slosson). Readily distinguished by its greenish color, and by the very broad,

Chelanops tristis *Bks.*—Can. Entom., Aug., 1891.

Only known to me from Long Island, N. Y. It lives under stones between tide-marks.

Chelanops morosus, sp. nov.

Length, 2 mm. Cephalothorax and palpi dark red-brown, abdomen brown, legs pale brownish. Cephalothorax with indistinct eye-spots, sutures distinct; abdomen broad; palpi large and stout; trochanter globose above, rounded behind and convex in front; femur shorter than cephalothorax, pedicellate, nearly cylindrical; tibia about as long as femur, slightly broader, quite long pedicellate, suddenly and strongly swollen on inner side near base, beyond concave, outer margin evenly convex; claw large, longer than the cephalothorax plus mandibles, but little rounded on the outer side, strongly and evenly on the inner side; fingers stout, curved and barely shorter than the hand. Hard parts with short thick hairs, not distinctly clavate.

Two specimens, Isle Royale, Lake Superior, (H. G. Hubbard).

Chelanops tumidus, sp. nov.

Length, 1.5 mm. Cephalothorax and palpi pale brownish yellow, abdominal scutæ brownish, legs pale. Cephalothorax rounded in front, sutures distinct, no eye-spots; abdomen moderately narrow, twice as long as cephalothorax, scutæ broadly divided; palpi short and stout; trochanter globose above and behind, convex in front; femur nearly as long as cephalothorax, pedicellate, broadest near base, slightly tapering to the tip; tibia but little shorter and a little broader than femur, pedicellate, outer margin evenly convex, inner margin quite strongly convex near base, beyond tapering; claw longer than cephalothorax, hand short and very broad and rounded at base, outer margin but little convex, inner strongly and suddenly swollen, then tapering to the fingers. which are plainly longer than the hand, and curved. Hard parts finely granulate and furnished with short clavate hairs.

Several specimens from under logs on the sea-beach, Indian River Inlet, Florida, April, 1880, (H. G. Hubbard).

Chelanops validus, sp. nov.

Length, 2 mm. Cephalothorax dark brown, palpi dark red-brown, abdominal scutæ brown, legs brownish. Cephalothorax with distinct sutures, and two faint eye-spots; abdomen one and one-half times as long as cephalothorax, scutæ well divided; palpi large; trochanter globose above and behind, convex in front; femur slightly shorter than the cephalothorax, pedicellate, very broad; tibia shorter than femur and plainly broader, pedicellate, evenly convex on outer side, inner margin much more strongly convex near base, concave beyond; claw as long as cephalothorax plus mandibles, very large, strongly and evenly convex on each side of hand, tapering to the stout fingers, which are about as long as hand, and curved. Hard parts finely granulate, and provided with short clavate hairs.

Several specimens, under bark; Lake Tahoe, Calif., July, (Hubbard). Differs from *Ch. tumidus* in larger size, broader body, darker color, more evenly convex hand and shorter fingers.

Chelanops pallipes *Bks.*—Can. Entom., March, 1893.

California.

Chelanops sanborni *Hagen.*

Chernes sanborni HAGEN, Record Am. Ent., 1868.

Known to me from Ithaca, N. Y.; Poughkeepsie, N. Y., (G. Van Ingen); Cambridge, Mass., (Hubbard).

Chelanops dorsalis, sp. nov.

Length, 2 mm. Cephalothorax and scutæ brown, palpi pale red-brown, legs brownish. Cephalothorax moderately narrow, sutures distinct, no eye-spots; palpi moderate; trochanter as usual; femur shorter than the cephalothorax, pedicellate, broadest near base, concave on inner margin near tip; tibia a little shorter and slightly broader than the femur, pedicellate, evenly convex on outer side, more strongly on inner side near base, beyond concave; claw moderate, as long as cephalothorax plus mandibles, not much convex on outer side, quite strongly on inner side at base, tapering to the fingers, which are nearly as long as the hand, and curved. Hard parts are finely granulate, and with short clavate hairs.

Several specimens under bark; Lake Tahoe, Calif., July, (Hubbard). Differs from *Ch. pallipes* in shorter fingers, smaller size, etc. Related to *Ch. sanborni*, but with shorter and stouter fingers, a more elongate body, and a more swollen tibia.

Chelanops pallidus *Bks.*

Chernes pallidus BANKS, Can. Entom., Aug., 1890.

I only know the type specimen from Ithaca, N. Y.

Chelanops affinis *Bks.*—Insect Life, May, 1894.

Crescent City, Florida, (Hubbard).

Sub-family GARYPINÆ.

ments. Cephalothorax narrow, somewhat triangular, much longer than broad, with a high elevated ridge each side, about parallel with the side margins, the space between the ridges concave in anterior portion, convex behind; the anterior margin of the elevated portion is rounded; each lower anterio-lateral angle of the cephalothorax is prolonged into a conic tubercle, or horn, which is slightly longer than broad at base. There is a trace of the posterior suture, but the anterior one is very obscure; on each side there are two prominent eyes about their diameter apart, the posterior one on a tubercle and looking backward. The abdomen is broad and depressed, narrower at base than at posterior margin, broadest on the 6th segment, the segments plainly divided. Palpi long and slender; trochanter swollen on the posterior side, anterior margin nearly straight; femur short-pedicellate; cylindrical, much longer than cephalothorax; tibia gradually enlarged from base to near tip, about as broad and nearly one-half as long as the femur; neither margin much convex; claw as long as femur, hand about one and one-half times as broad as femur, nearly cylindrical, and about twice as long as broad; fingers much longer than hand, very slender and nearly straight. Legs about as usual, but no trochantins visible on the posterior hairs. All hard parts coarsely granulate; no hairs on palpi, except fine ones on fingers, a few thick ones on the legs with fine ones on tarsi.

This interesting species was found by Mr. Hubbard between the laminæ of rocks at Specimen Ridge, Yellowstone Nationa] Park. Many were young and had formed little cases of silk and earth, in which to pass the moulting period. The structure of these young forms is not, however, different from that of the adult. This species might, on account of the structure of the cephalothorax and the absence of trochantins, form a new genus.

Garypus floridensis, sp. nov.

Length, 4 mm. Body pale brown, legs and palpi, except claw, pale brownish yellow, claw red-brown. Cephalothorax with mandibles triangular, longer than broad, very much narrowed in front, anterior margin emarginate and about one-fourth as long as posterior margin; sutures distinct; two eyes each side nearly touching, the posterior one looking backward. Abdomen depressed, much broader behind than in front, broadest on 7th segment, scutæ short and quite broadly divided. Palpi moderately slender; trochanter swollen behind, convex in front; femur gradually enlarged from base to tip, slightly longer than the cephalothorax; tibia a little pedicellate, enlarged from base to near tip, about two-thirds as long as femur and a trifle broader, neither margin much convex; claw pedicellate, longer than femur, hand about as long and nearly twice as broad as tibia, somewhat cylindrical; fingers about as long as hand, and plainly curved. Hard parts finely granulate, and with short, fine, scattered hairs. Trochantins quite plain on posterior legs.

Several specimens of this large species were collected by Mr. Hubbard under drift-wood on the ocean beach, near St. Lucie River, Indian River, Florida, in April 1880.

Garypus granulatus *Bks.*—Can. Entom., Aug., 1891.

In the crevices of a cliff, Ithaca, N. Y.

Family OBISIIDÆ.

Sub-family OLPIINÆ.

Olpium *Koch.*

This genus and the next form the transition from the previous family to the true Obisiidæ.

Olpium obscurum *Bks.* – Can. Entom., March, 1893.

Besides the type, I have one specimen from Punta Gorda, Fla., (Mrs. Slosson).

Atemnus *Canesta.*

Differs from *Olpium* principally in lacking eyes, and in having the trochantins visible on all the legs.

Atemnus elongatus, sp. nov.

Length, 3 mm. Cephalothorax and legs yellowish, abdomen brownish, palpi red-brown. Cephalothorax smooth, one and one-half times as long as broad, narrowed in front, no trace of eyes; mandibles about one-third the length of cephalothorax, with a long slender, and simple stylet; abdomen not broader than cephalothorax and fully twice as long. Palpi heavy, but not long; trochanter swollen behind, convex in front; femur pedicellate, shorter than cephalothorax, about twice as long as broad, broadest near base; tibia about as long and as broad as femur, pedicellate, outer margin moderately, inner margin quite strongly convex; claw about as long as cephalothorax plus mandibles, much broader than tibia, broadest near base and tapering to the fingers, which are stout, curved, and plainly shorter than the hand. Legs short and stout, trochantins distinct on all pairs. Body and appendages with scattered simple hairs. One specimen with almost black cephalothorax and palpi does not differ otherwise from typical specimens.

Beaten from dead hickory wood in April, near St. Lucie Riv., Indian River, Florida, by Mr. Hubbard; also at Sand Point, and Enterprise, Florida, Punta Gorda, Fla., (Mrs. Slosson). A young

Cephalothorax about as broad as long .... **threveneti.**
Cephalothorax distinctly longer than broad .... **rufulum.**

Ideobisium threveneti *Simon.*

Obisium threveneti SIMON, Ann. Soc. Ent. Fr., 1878.

Common on the Pacific Coast States. In moss and rotten wood, Portland and Astoria, Oreg., (Hubbard); Portland, Oregon, (Schwarz); Temino, Wash., (Hubbard); Olympia, Wash., (Kincaid); Simon had it from California.

Ideobisium rufulum *Bks.*

Olpium rufulum BANKS, Can. Entom., Aug., 1891.

Washington, D. C.; Fredricksburg, Va., (Richardson).

Ideoroncus *Balzan.*

Differs from the preceding genus in having but two eyes. The males which I have seen lack the stylet to the mandibles, a strange exception.

Ideoroncus obscurus *Bks.*—Can. Entom., March, 1893.

The specimens from which I described the species were not quite adult; adult ♀'s are often 4 mm. long and usually darker than described. It is common in the extreme West. Olympia, Wash., (Kincaid); Nat'l. Park, (Hubbard); Bear Paw Mts., Mont., (Hubbard); Assiniboine, Mont., (Hubbard); one specimen, Lake Tahoe, Calif., (Hubbard).

Tribe OBISINI.

Obisium *Ill.*

Our species of this genus may be separated as follows:

1 { No eyes, cave form .... **cavicola.**
  { Four eyes, not cave 2
2 { Tibia of palpus with the inner side first convex, then nearly straight, fingers longer than hand 3
  { Tibia of palpus with inner side evenly convex 4
3 { Hand about twice as long as broad, large species .... **carolinensis.**
  { Hand one and one-half times as long as broad, small species.. **brunneum.**
4 { Fingers very much longer than hand .... **macilentum.**
  { Fingers a little shorter than hand .... **parvulum.**

Obisium cavicola *Pack.*—Am. Nat., Feb., 1884.

Unknown to me. Somewhat peculiar in the shape of the cephalothorax and in the form of the tibia of the palpus. New Market Cave, Va.

Obisium brunneum *Hagen.*—Record Am. Ent , 1868.

This is the common species in the northern states. It occurs under leaves in woods. Ithaca, N. Y.; Sea Cliff, L. I.; Salineville, Ohio, (A. D. MacGillivray); Poughkeepsie, N. Y., (G. Van Ingen); Cambridge, Mass., (Hubbard); Detroit, Mich., (Hubbard); and one specimen from Wasatch and Alta, Utah, (Hubbard), seems to be the same species.

Obisium parvulum, sp. nov.

Length, 1.6 mm. Cephalothorax and mandibles pale yellowish brown, palpi except fingers paler, abdomen sprinkled with silvery dots. Very similar to *O. brunneum* but the tibia of palpus is shorter, less pedicellate, broader and strongly and evenly convex on inner side; the claw is a little larger, the hand longer and the sides more nearly parallel; the fingers stouter and shorter, about equal to, or a little shorter than the hand.

One adult and several young, without locality (Hubbard). This was in the same vial as *Chelanops dentatus*, which I think must be from Florida.

Obisium macilentum *Simon.*—Ann Soc. Ent. Fr., 1878.

South California (Curtis), one specimen.

Obisium carolinensis, sp. nov.

Length, 3 mm. Cephalothorax dark brownish, shining, abdomen brown, palpi red-brown, legs yellowish. Cephalothorax smooth, narrowed a little in front of eyes, a small median tooth on the anterior margin, the two eyes each side nearly touching. Abdomen but little broader than cephalothorax, two and one-fourth times as broad. Palpi moderately long; trochanter simple; femur longer than cephalothorax, about as broad as a mandible, nearly equally broad throughout; tibia pedicellate, as long as width of cephalothorax, little broader than the femur, and but slightly convex on inner side; claw about as long as cephalothorax plus mandibles, nearly twice as broad as tibia, broadest near base and tapering to the fingers,

Tribe CHTHONINI.

Chthonius *Koch.*

The six species may be separated as follow:

1	Cave species, two or no eyes	2
	Not cave species, four eyes	3
2	Hind legs about twice as long as the abdomen	**packardi.**
	Hind legs not much longer than abdomen	**cœcus.**
3	Cephalothorax and mandibles with small spines, each tipped with a hair	**spinosus.**
	Without any spines	4
4	Eyes close together, almost touching	**mœstus.**
	Eyes distinctly separated	5
5	Hind eye about twice its diameter from front eye, cephalothorax much wider in front than behind	**pennsylvanicus.**
	Hind eye not twice its diameter from front eye, cephalothorax but little wider in front than behind	**longipalpis.**

Chthonius packardi *Hag.*—Zool. Anzeiger, July, 1879.

Indian Cave, Barren Co., Ky., (Hubbard); Mammoth Cave, Ky.; Wyandotte Cave, Ind.

Chthonius cœcus *Pack.*—Am. Nat., Febr. 1884.

Unknown to me. Weyer's Cave, Va.

Chthonius pennsylvanicus *Hag.*—Rec. Am. Ent., 1868.

Pa.; Poughkeepsie, N.Y., (G. Van Ingen); one specimen, Lake Poinsett, Fla., (Hubbard).

Chthonius longipalpus *Bks*—Can. Ent., Aug. 1891.

Ithaca, N.Y.; Sea Cliff, N. Y.; Washington, D. C.; Fredricksburgh, Va., (Richardson).

Chthonius mœstus *Bks.*—Can. Ent., Aug. 1891.

Ithaca, N. Y.

Chthonius spinosus *Bks.*—Can. Ent., March 1893.

Citrus Co., Fla., (C. M. Weed).

Lechytia *Balzan.*

Proposed by Prof. Balzan for his *Roncus chthoniiformis* with which my *Roncus pacificus* appears to be congeneric. The palpi are shorter than in *Chthonius.*

Lechytia pacifica *Bks.*

Roncus pacificus BANKS, Can. Entom., March, 1893.

Olympia, Washington, (Trevor Kincaid).

NEW NORTH AMERICAN TETTIGINÆ. I.

By ALBERT P. MORSE, Wellesley, Mass.

Having received for determination a considerable amount of material in this sub-family from Prof. Otto Lugger, Mr. S. H. Scudder, Mr. Samuel Henshaw, Cornell University, Museum of Comparative Zoology, and a set of the different forms in the collection of Prof. Lawrence Bruner, it has seemed worth while to undertake the preparation of a Synopsis of the North American forms of this group, to be illustrated with drawings of the diagnostic characters. Such being the case, I shall be glad to examine all material sent to me, or to obtain material in this group by purchase or otherwise. Pending the publication of such a work it seems advisable to make known by description the following forms.

Measurements are in millimeters, the extremes alone being given. "Length" refers to the length of the insect from the front of the vertex or head to the tip of the pronotum or wings, as the case may be. "Pronotum > hind femora" means that the pronotum passes the hind femora, and if the quantity is preceded by a – sign, the pronotum fails to pass by that amount. With these explanations the tables of measurements will probably be clear.

Nomotettix parvus, sp. nov.

Small. Vertex of head projecting in advance of eyes about ⅔ the length of an eye, the anterior margin obtuse-angulate, its sides nearly straight, rounding shortly into sides of crown, the mid-carina showing from above as a very small, slightly projecting tooth. Mid-carina low on the crown, disappearing opposite the middle, or middle of the posterior half, of the eyes. Profile rounded or round-

and flatter crown in side view, with the excavation opposite the eyes shallow and rounded instead of sharply excised.

4 ♂, 1 ♀, 1 yg., St. Anthony Park, Minn. From Prof. Otto Lugger.

Nomotettix compressus, sp. (?) nov.

Very similar to *N. cristatus* Harris, resembling it in size and proportions of body, but differing as follows: Median carina of pronotum a little higher, especially opposite the shoulders, more smoothly arched on top, and distinctly compressed into a thin keel, which is about 1 mm. in height at the shoulders and so thin in section that the punctulations of its surface appear translucent when held to the light. Dorsal front margin of pronotum much advanced upon the head, projecting over it a distance nearly or quite equal to one-half the distance between the lateral carinæ, with the sides strongly concave, — in *cristatus* projecting but one-fifth to one-third the above distance and with the sides less excavated.

	Length.	Pronotum.	Hind fem.	Antenna.
♂	8.4	7.8	5.—6.	2.5
♀	9.—9.5	8.5—8.8	5.—6.	2.8

Such are the characters presented by a series of 2 ♂, 5 ♀, probably from North Carolina, presented by Prof. G. F. Atkinson to Cornell University (lot 105).

While at first disposed to consider it a distinct species, subsequent examination of material from Indiana, Maryland, and Georgia seems to indicate that it may grade into the typical New England form of *cristatus*, the pronotum in some of these specimens having the carina less distinctly compressed and the anterior margin less produced. Additional specimens in suites, with observations on altitude, environment, etc., are necessary in order to settle the relation of the two forms satisfactorily, whether racial or specific.

Tettigidea acuta, sp. nov.

Very similar to northern specimens of *T. lateralis*, differing as follows: Anterior margin of pronotum produced into an acutely pointed process, reaching nearly to the mid-carina of vertex; the latter is less prominent opposite the lower part of eyes and higher on top of head, and the occiput is less protuberant. Dorsum of pronotum smoothly granulated, with very faint irregular rugulæ; mid-carina distinct, but slight, especially at shoulders, where the pronotum is nearly convex in cross section, instead of tectiform. From *apiculata* it may be readily distinguished by the vertex.

Color brown to dark brownish fuscous, more or less of the top of pronotum straw-colored. Elytral pale spots rather larger than in *lateralis*.

	Length.	Pronotum.	Hind fem.	Pron. > Hind fem.	Wings > Pron.
♀	16.8—17.3	15.5—15.8	8.	1.5--2.5	1.—1.4

3 ♀, New York (Uhler, coll. S. H. Scudder). One specimen badly mutilated, but undoubtedly this species.

Tettigidea apiculata, sp. nov.

A slender species. Vertex considerably advanced in front of eyes, recalling *prorsa*, once-and-a-half (♂) or twice (♀) as wide as an eye, not protuberant above. Eyes about twice as long as wide, little protuberant, surrounded by a slight but distinct lip. Carina large, much elevated on top of vertex, stopping abruptly opposite anterior part of eyes; strongly sinuous on face, protuberant opposite eyes, sub-excavate below them. Pronotum cuspidate before, subulate behind, considerably passing the hind femora, the dorsum coarsely and distinctly rugulose excep on a narrow band over the shoulders and the lateral lobes which are granulose. Median carina distinct, acute (except scarcely so in ♀ on aforesaid band). Anterior margin much produced over head (one-half the distance between lateral carinæ), nearly rectangular, the sides sinuate, expanded next base and excavate next apex, terminating in a sharp, finely pointed and slightly deflected cusp, which reaches to the posterior end of the carina of the vertex. Wings passing the pronotum. Hind femora rather slender, elongate.

Dark reddish brown, paler on face and lower half of lateral lobes of pronotum, passing into luteous on hind tibiæ.

Length.	Pronotum.	Hind fem.	Pron. > Hind fem.	Wings > Pron.
♂ 13.7	12.2	6.	1.8	1.4
♀ 18.	15.5	8.4	2.5	1.8

1 ♂, 1 ♀, New Orleans, La., (Akhurst, in coll. of S. H. Scudder).

Tettigidea prorsa elongata, var. nov.

This form is exactly like *prorsa* but with the pronotum and wings, or wings alone, extending beyond the hind femora.

Length	Pronotum.	Pron. > Hind fem.	Wings > Pron.
♂ 10.8	8.0	.0	1.
♀ 13.2	10.5	(− .2).2	2.

1 ♂, 1 ♀, Georgia (coll. S. H. Scudder). 1 ♂, Georgia (coll.

A COMBINATION OF TWO CLASSIFICATIONS OF LEPIDOPTERA.

By HARRISON G. DYAR, A. M.

The present article is the third in a series of papers on the classification of lepidopterous larvæ.* I believe that I have now brought out the characters exibited by the larval tubercles sufficiently so that they may be considered to be known. The next thing in order is to combine the classification derived with this given set of characters with other classifications derived from other characters, in order to approximate to a natural classification. It so happens that the only classification sufficiently worked out for my purpose, is the old one founded upon the venation of the wings. That suggested by Mr. V. L. Kellogg on scale structure, as well as Prof. J. B. Smith's idea of using the general body structure or Dr. A. S. Packard's special head characters have never been completed, nor even well outlined with tangible points of contrast.

In the first place, I regard the suborders of the Lepidoptera, the Jugatæ and Frenatæ, to be established. All lines of research have tended to confirm this conclusion, with perhaps the exception of the pupal characters. But this is scarcely to be regarded as an insurmountable exception. In the following, then, we will confine our attention to the divisions of the Frenatæ.

The divisions which I propose to consider are of greater than family rank. The families of the Frenatæ are reasonably compact and well defined. A few intergrade, others are scarcely of family rank and again other genera may be entitled to a higher position than they now occupy. But these objections will right themselves as our knowledge of the complete life histories of all the species advances, for I believe the system of family classification and definition is not at fault.

To return to the higher divisions, the superfamilies or tribes. It is clearly the function of a natural classification, one founded by a synthesis of special classifications, to so expound the various characters used in the several classifications that they do not tend to produce conflicting results. It is scarcely possible in using one set of characters only, to adequately differentiate between the characters due to adaptation and those of real phylogenetic significance. Now it is hoped that the present attempt to combine two classifications founded on two very different sets of characters, may tend to show which of the characters in each set are reliable, or at least which are evidently unreliable; in other words parallel adaptations.

---

* The first appeared in the Annals of N. Y. Acad. Sciences, Vol. VIII, p. 194 (1894); the second in Transactions of N. Y. Acad. Sciences, Vol. XIV, p. 49 (1895).

Before proceeding to the discussion, I will dispose of a few notes on larval tubercles, which extend my former observations to certain families not then examined.

Family ADELIDÆ.

On larval characters, the group represented by *Adela* must be given family rank. I have not studied the moth. I have examined the following species.

Adela viridella.

A dorsal shield on each thoracic segment as in the Psychidæ. Setæ fine; pale, arising from large, diffuse, brown, corneous areas; i and ii remote, out of line; iii above the spiracle; iv and v from a single area close below and behind the spiracle (on joints 5 and 6 the areas of iii and iv+v are fused); vi subventral; vii without corneous area, represented by a very indistinct, small seta on the anterior outer side of the slight foot prominence. Feet represented by two transverse multiple rows of rudimentary hooks, grading off imperceptibly into the skin surface.

This is the most generalized larva of Frenatæ that I have seen. It should be placed at the bottom of the series and be followed by the Psychidæ.

Family TINEIDÆ.

Only a single dorsal (prothoracic) shield, rarely a mesothoracic a small black area; vii without any black area, consisting of three setæ above base of foot; viii inside of base of foot next midventral line. Abdominal feet slender, well developed, the crotches in a single complete circle.

Gelechia rhombella.

A distinct corneous cervical shield. Setæ distinct, but without corneous areas; i dorsad to ii, remote; iv and v closely approximate, normal; feet moderate, the crotchets in a ring.

Endrosis lacteella.

Cervical shield well cornified, large; setæ long and fine, the tubercles scarcely perceptible; i dorsad to ii, iv and v closely approximate, all normal. Feet well developed, the crotchets in a single circle.

Plutella porrectella.

Cervical shield reduced to a series of dots. Setæ fine, short, but black and very distinct, arising from minute black tubercles; i dorsad to ii; iv and v in line, rather remote, entirely unconsolidated; other setæ normal; vii composed of three closely approximated setæ. Feet well developed, the crotchets in a circle but breaking down and incomplete on the outer side.

Hyponomeuta cognatellus.

Cervical shield distinct. Setæ fine but long, from minute obscure tubercles; ii slightly dorsad to i (compare Psychidæ), i being situated at the upper border of a subdorsal black patch; iii lateral; iv and v remote, iv being moved up out of line with v, almost on a level with lower border of spiracle; vi posteriorly subventral; vii of three setæ on base of leg, the upper one not closely approximated to the other two; viii next midventral line. Abdominal feet rather short, the crotchets three rows deep in a circle.

Acrolepia assectella.

Cervical shield sub-corneous. Setæ short, from minute tubercles surrounded by a diffuse sub-corneous area; i dorsad to ii, normal; iii close above the spiracle and slightly anterior; iv and v remote, iv moved up a little out of line; vi posteriorly subventral; vii of three setæ closely approximated; viii normal. Feet moderate, a single outer circle of crotchets and a second concentric inner row, represented only on the inner side of the foot (i. e. broadly broken outwardly).

Laverna phragmitella.

Cervical shield not distinguishable, the larval shape thicker than usual, slightly flattened approaching the shape of the Anthrocerina. Setæ fine, obscure, tubercles absent; i slightly dorsad to ii; iii above spiracle; iv and v greatly reduced, scarcely to be made out under a half-inch objective, apparently in line and rather remote; vi, vii and viii normal; feet well developed with a single circle of crotchets.

Tinea pellionella.

Cervical shield distinct. Setæ short, very fine, obscure, tubercles absent; dorsad to ii; iii lateral; iv and v not very closely approximate; iv dorsad to v, the rest normal. Feet represented by a transverse ellipse of crotchets narrowly broken on the inner side.

Coleophora ochripennella.

Cervical shield (prothoracic) large, supplemented by a second (mesothoracic) one, small, widely bisected into two triangular halves. Setæ fine, short, greatly reduced, without tubercles; i small, dorsad to ii; iv and v apparently in line; v much shorter than iv, all very difficult to distinguish, and I cannot feel sure of their position. Feet nearly obsolete, represented by two transverse rows of very few crotchets.

Tischeria complanella.

Flattened, evidently a leaf miner; cervical shield sub-corneous. Setæ very obscure, rudimentary, no tubercles; iv and v appear on the lateral bulging outline of the segments, moderately approximate, iv a little dorsad to v. Legs absent, even the thoracic feet reduced to little rounded stumps.

Family ORNEODIDÆ.

Orneodes hexadactyla.

Cervical shield not corneous, practically absent. Setæ moderately distinct, single, from minute tubercles; i and ii remote, i dorsad to ii; iii lateral; iv and v closely approximate, iv slightly dorsad to v; vi sub-ventral; vii of three setæ on base of leg; viii normal. Feet moderate with a single circle of crotchets. An arrangement perfectly typical for the Cossina.

Family HETEROGYNIDÆ.

Heterogynis paradoxa.

Body robust, thickened, head retractile, resembling the Anthrocerina; setæ single, fine but distinct; iv and v approximate, almost in line transversely; vi represented by two setæ; the rest normal for the Cossina. Crotchets of abdominal feet forming a dense semicircle on the inner half of the planta.

Family PTEROPHORIDÆ.

are less numerous than in *scarodactylus*, and are more confined to the dorsal area, being also slightly more pointed and tubercular. The small, slender abdominal feet have no crotchets.

Platyptilus rhododactylus.

Setæ distinct, rather coarse, single, arising from somewhat enlarged conical tubercles, supplemented by a number of short secondary hairs with enlarged tips; i dorsad to ii, not approximate: iv and v closely approximate, all normal. Feet slender, the crotchets in a single row forming a semicircle on the inner side of the planta.

Oedematophorus lithodactylus.

Tubercles converted into small warts, each bearing some ten to twelve setæ; i and ii in line, closely approximate but not consolidated; iii lateral, behind it a little secondary wart with one small seta; iv+v also with a little secondary wart with three setæ behind; vi and vii each a distinct wart; viii represented by rather numerous hairs on the base and inside of the leg. Legs slender, the crotchets in a half circle on the inner side.

Oxyptilus periscelidactylus.

Tubercles converted into moderate sized warts with six to twelve long hairs; body also rather sparsely covered with short secondary hairs with enlarged tips: i and ii entirely consolidated into a single wart, a single long seta behind iv+v; viii a single seta; other warts normal. Legs slender, the crotchets forming two-thirds of a circle on inner side.

Family DIOPTIDÆ.

Phryganidia californica.

Mr. T. G. O. Mueller has kindly obtained the larvæ of this species for me in its home in California. The larvæ are referable to the Noctuina.

Setæ small and inconspicuous, but normal; a slight development of smaller secondary setæ consisting of one above and caudad to iii, another below and caudad to iii close above the spiracle; iv and v remote, iv moderately well moved up; many setæ on the leg plate. Larva otherwise naked, noctuiform; joint 12 enlarged and 13 small; anal feet slender, divergent and rather weaker than the others.

Family BREPHIDÆ.

I have before me the larvæ of three European species of *Brephos*. The setæ are greatly reduced, but the tubercles remain rather distinct, in the normal arrangement of the Noctuina, without secondary hairs. The interesting point is the structure of the legs. All the abdominal ones are present, but the three anterior pair are about half aborted. In the Geometridæ, these legs are entirely aborted and in many Noctuidæ the first pair or first two pair are partly or completely aborted, so that the Brephidæ stand intermediate between these two families, but somewhat on the side of the Geometridæ.

Family NOLIDÆ.

On larval characters the genus *Nola* is deserving of family rank. These larvæ have been a great puzzle to me, and will probably remain so till I have the opportunity of observing the first stage. I have before me the larvæ of five Eurepean species of *Nola*. They correspond in all structural respects exactly with the American species. The arrangement of the warts is exactly that of the Anthrocerina as represented by the genera *Anthrocera*, *Adscita*, *Aglaope* and *Harrisina*, and less perfectly by *Megalopyge*; but with the important exception that, while in these Anthrocerina wart vii is distinctly situated on the anterior side of the slender abdominal feet, in *Nola*, the hairs of vii are scattered over a distinct corneous leg plate on the outer side of the foot. This leg plate is a typical noctuine structure, and it appears probable that the Nolidæ belong among the Noctuina where the moths are at present placed. But I am at a loss to conjecture what has happened to the tubercles.

Family EUPTEROTIDÆ.

This family has its stronghold in India, but is represented in Europe by at least one genus (according to Hampson). I have before me the larvæ of four species of this interesting genus. Not only do the tubercles show the position of the Eupterotidæ to be among the Noctuina, but their structure throws an unexpected

The arrangement is close to that of the bombycoid noctuids but differs in that tubercle v tends to become small instead of iv, while in the Noctuidæ iv is moved much farther up than in these Eupterotidæ. There is also a considerable resemblance to the hairy Notodontians.

Cnethocampa pinivora.

Primary hairs less abundant than in *C. herculeana*, the warts smaller and more reduced. Wart i is indistinct on account of its modification for the dorsal tufts which seem to be, in this species, partially replaced by a raised, somewhat eversible (?) area of skin which the stiff hair borders before and behind. Wart v very small, almost obsolete on account of the general reduction of all the warts. Secondary hairs more abundant, longer and stiffer than in *C. herculeana*.

Cnethocampa processionea.

Hairs and warts about as in the preceding, the secondary hairs not so wel developed. Dorsal areas not eversible, covered with dense, fine and short down, the posterior stiff hairs scarcely developed at all. Warts iv and v very nearly in line. iv the larger and a very little dorsad to v, which has only one or two hairs and is really absent on some of the segments.

Cnethocampa pityocampa.

Dorsal areas eversible (?), downy, surrounded by a ring of soft reddish hairs. Warts greatly reduced, the hairs rather few and no stronger than the secondary hairs which are well developed. Wart iii is rather distinct; the position of iv and v can just be distinguished with a lens, iv the more distinct and dorsad to v.

Family LASIOCAMPIDÆ.

In the larvæ of this family the primitive first stage has disappeared. The mature warts are greatly reduced and obscured by secondary hairs, so that I could not obtain sufficiently positive evidence of their arrangement. The series of eupterotids described above shows beautifully the course which has been pursued in the development of the lasiocampid larva as we see it to-day. Derived from a bombycoid-noctuid, or lymantriid stock, by the suppression of the warts and development of secondary hairs in a manner parallel to that seen in the Eupterotidæ, the typical lasiocampid form has been evolved. Tubercles iv and v appear to have dropped back nearly into line in the first larval stage, probably by degeneracy toward the original primitive arrangement.

Clisiocampa fragilis.

Stage I. Wart i large, sub-dorsal; ii minute, a little caudad and below i; iii small, lateral; iv and v approximately in line, sub-ventral, very obscure; no others seen; no secondary hairs.

Clisiocampa neustria.

Mature larva. Several coarse black hairs arise from an area representing i, and a single hair from ii; other warts obsolete. Secondary hairs fine and soft, quite abundant sub-ventrally. Body scarcely flattened, a slight noctuiform dorsal enlargement on joint 12.

Lasiocampa quercus.

Secondary hairs abundant, thick, forming broad bands of dense hair absent only at the edges of the segmental incisures but becoming short and thin laterally and sub-ventrally. Primary hairs absent, the position of i and ii indicated by a disturbance in the uniformity of the dorsal hairy coat. Just below the spiracle and behind it an area can be distinguished which represents iv, and before and below this, another smaller one, rather a colored spot than a structural area, represents v. The area corresponding to vi, is well clothed with hairs and projects a little.

Gastropacha quercifolia.

Greatly flattened with well developed sub-ventral "lappets" and an unpaired dorsal prominence on joint 12. Hair rather abundant, but not long, all secondary. Patches of vivid white, short, dense hairs occur between the legs sub-ventrally. Seen at a distance a series of blackish patches seem to represent tubercles i and ii, but under the lens nothing appears but patches of dark pigment; a black pigment spot behind the spiracle. Sub-ventral area in the region of tubercle vi produced in two rounded confluent and hairy processes, forming the lappet.

CONCLUSION.

As regards the characters of wing structure, I believe the following are be eliminated as unreliable.

1) *The frenulum.* This structure seems very flexible and readily subject to adaption. It is not reliable even for family definition in many cases. I have before me the European *Endromis versicolor* and the Australian *Chelepteryx collesi.* In all characters

As regard the larval characters:

1) *The arrangement of crotchets on the feet.* The hooks on the abdominal feet are not very reliable characters, as their arrangement is quickly subject to modifications whenever the necessity arises for an exposed mode of life by the larva. The presence of the unmodified condition is of more value than its absence, inasmuch as no larva of the higher families possesses this typical structure even when returned to a concealed mode of life, whereas some of the lower ones may possess a considerably specialized foot structure.

2) *The tubercles.* The special modifications of the tubercles (warts, processes etc.) are not of more than family rank, often of only generic rank.

There remain, then, for primary divisions in the wing veins the presence of vein 1c; in the larvæ the approximation in position of tubercles iv and v. In the higher moths of the first division (Pyralidæ, the Saturnians above the Bombycidæ and a few others) there is a tendency, often complete, to the disappearance of vein 1c. In the larvæ of several genera of the lower families (Tineidæ) tubercles iv and v are scarcely approximated or even remote and out of line.* But taken together, the exceptions tend to eliminate themselves. As I am only combining two classifications, some gaps may occur.

In the second primary division vein 1c is absent from the wings and larval tubercles iv and v are remote. In some Dioptidæ there is a partial development of vein 1c on hind wings, but the larval characters are normal.

First division. I have divided this into three super-families on larval characters but, as there appears to be no corresponding character in the venation, my Cossina and Anthrocerina must be united. Further, the Pterophoridæ cannot be placed positively in the Cossina or Anthrocerina as different genera exhibit the characters of both divisions.

We have left, then, first, the Cossina (Microlepidoptera) with generalized wing veins and usually a frenulum, the larvæ with tubercle ii either present or disappearing by fusion with i; and, second, the Saturnia (Bombyces) with specialized wings, robust bodies and frenulum tending to disappear, the larvæ with tubercle ii disappearing by abortion by the first moult.

---

* This is probably due to the generalized condition of these larvæ, which have retained the primitive arrangement of the setæ found also in stage I of the butterflies.

Second division. The super-families established on larval characters in this division seem to be quite corroborated by the imaginal ones.* It remains only to unite the Noctuidæ, Geometridæ, Arctiidæ and a few minor families under the term *Noctuina* to render the classifications identical. Indeed it will be seen that the only reason for giving such families as the Noctuidæ and Geometridæ greater than family rank has been the great number of species in each, and the consequent impression they have produced of a large and definite aggregation. Their differential characters do not warrant such a position.

We have then the super-families Noctuina, Sphingina and Rhopalocera, named in ascending order.

Antennæ filiform, pectinate, or rarely slightly thickened before the tip. Larval tubercles iv dorsad to v except in a few instances when iv and v are in line.......................................**Noctuina.**
Antennæ fusiform, body robust, wings elongate, with distinct intercostal cell. Larval tubercles v dorsad to iv...................**Sphingina.**
Antennæ clubbed or knobbed at tip, or if simple, the anterior pair of feet partly aborted. Larval primary tubercles soon aborted, iv and v in line or iv dorsad to v when the mature armor is secondary.**Rhopalocera.**

I have not combined, as a third classification, Dr. T. A. Chapman's arrangement on pupal characters† because I have not undertaken to examine the subject personally and because I expect that Dr. Chapman will modifiy his arrangement somewhat before it is fully completed. As it stands, there are many things in corre-

LIFE-HISTORY OF HETEROCAMPA OBLIQUA *Pack.*

By A. S. PACKARD.

The eggs of a female of this species which is of the form *brunnea*, were received from Providence, R. I, through the kindness of Mr. W. Dearden, July 13, and hatched at Brunswick, Me., July 20—21. It feeds on the oak. It was reared at Brunswick.

Egg.—Diameter, .9 mm. Of the usual hemispherical shape, moderately flattened above; shell under a lens seen to be finely pitted or shagreened; under ½ inch, A eye-piece, marked with rather large hexagonal areas, with well marked, raised edges, but not distinctly beaded. The hole eaten in one side by the larva in escaping of the usual elongated kidney-shape.

Larva, Stage I.—Freshly hatched. Length, 3.5 mm. Head very large, much wider than the body, somewhat flattened in front; pitchy amber, smooth, unarmed, surface dull, not polished. On the 1st segment arising from a dark cervical plate is a pair of large branching horns with three large equal curved tines, which are pointed and densely spinose, the short stout spinules dark, quite different from *H. guttivitta.* One tine points forwards, one backwards and one laterally outwards. The body is purplish reddish, with no stripes or other marks, except a small pale yellowish transverse dorsal spot in front of the base of the 8th segment. No horns on the 2nd and 3rd thoracic segments. On the 1st abdominal segment is a pair of simple dark horns about as long as the segment is thick. On 2nd segment a pair of minute setæ; on 3rd a pair of blunt spines one-half as long and large as those on the 1st, and a slightly smaller pair on the last (10th) segment. End of body carried uplifted, and the two cylindrical anal legs blunt at the end and entirely dark. Thoracic legs blackish; the four pairs of middle abdominal legs dark livid. It molted July 27.

Stage II.—Length, 6 mm. Head reddish brown. Now all the horns have disappeared, those on the 1st thoracic segment only represented by two conical acute tubercles which are black at the tip and slightly forked, there being a small black supplementary spine on the inside of the main one. The two spines are wide apart and project out laterally. On 9th abdominal segment are two twin minute black spinules situated close together. Body pale reddish, color of an oak twing, variegated with yellowish; a distinct linear dorsal line and a broad diffuse line on thoracic segments; an irregular series of large dorsal yellowish spots, those on abdominal segments 1—4, and 6, 7 and 9 being the largest. Anal legs moderately long, reddish.

Stage III.—It molted Aug. 1. Length, 8—9 mm. The head is now large, wider than the body, subtrapezoidal in front, rounded above, and slightly bilobed; pale in front, yellowish on the sides. An irregular pale reddish brown band on the vertex and on the sides enclosing in front four irregular reddish spots of the color of a dead leaf which may be called sere brown. Prothoracic spines now stout and pale reddish, ending in three black spinules. From each spine proceeds, a broad reddish brown band the color of a dead leaf, and enclosing a large oval yellowish spot which extends along the back of abdominal segments 1 to 4. This spot encloses two reddish lines which dilate four times enclosing a roundish white spot in each dilatation. On segments 5—7 is a long triangular whitish spot enclosing two short reddish lines which dilate twice, enclosing two narrow oval spaces. The back of segments 8 and 9 is reddish, the sides yellowish green, whitish; anal legs held up at rest; greenish with a red stripe within. The reddish portion of the body consists of irregular fine reddish and greenish-yellow lines, the former predominating.

Stage IV.—It molted Aug. 8, A.M., and ate up the cast skin before beginning to eat the oak leaves. Length, 12 mm. (Two days before this molt the lateral sere brown spots appeared as in this stage, but fainter.) By Aug. 12th it had become 20 mm. in on 2nd thoracic segment are similar yellow lines, not reaching the front edge of the prothoracic segment, nor extending behind the oblique sere brown band.

Stage V and last.—Described Aug. 29. Length, 40 mm. Now there are no prothoracic tubercles, but in place of each of them a very slight elongate flattened callosity. Head rounded, smooth, not so wide as the body; luteous, with a flesh-tint and slightly purplish; an ashy irregular band on each side of the head, above the ocelli, with scattered spots between. The body is thickest in the middle (much like Abbot's drawing) and pale flesh, marked with numerous irregular reddish pink wavy hair lines. The usual dorsal band is reddish, bordered with yellow, and enclosing a pale almost whitish band. From the prothoracic segments the two lines contract, dilating on the 3d thoracic segment, and becoming widest apart on the 2nd and 3rd abdominal segments and again widely separating on the 7th abdominal segment; the two lozenge-shaped spots thus formed enclose two parallel median pinkish lines. On the suranal plate the two lines unite to form a median pale sere brown band. Thoracic and abdominal legs pale, marked with red.

The freshly hatched larva differs from that of *H. guttivitta* in having no traces of tubercles or horns on abdominal segments 4 to 6; in the first pairs having tines of quite different shape, being thicker, and more spinose; these horns being dull chitinous, of the same hue as the head. The other dorsal tubercles are about one-quarter as long, not elbowed, and stouter in proportion, while those on the 8th segment are smaller.

◆

EXPLANATION OF PLATE I.

Fig. I. Heterocampa obliqua *Pack.*—Freshly hatched larva; *Ia*, dorsal view; *Ib*, spine on third, *Ic*, spine on eighth, *Id*, spine on ninth abdominal segment; *Ie*, prothoracic horns of stage I, enlarged.

Fig. II. Heterocampa obliqua *Pack.*—Stage II; *IIa*, horns on first prothoracic segment.

Fig. III. Heterocampa guttivitta *Walk.*—Horns in stage I; *a*, prothoracic horn; *b*, one on second abdominal, *c*, one on third to fifth, and *d*, on ninth abdominal segment.

A CLEW TO THE ORIGIN OF THE GEOMETRID MOTHS.

By A. S. PACKARD.

In examining the pupa of *Phryganidia californica*, and finding the more essential features to be as much like those of the Geometrid moths, as any other group, I came upon results entirely unexpected to myself, and which give a clew to the origin of this great group of moths. It has become evident that *Phryganidia* can neither be placed among the Zygænidæ, or Syntomidæ, though possessing some pterogostic features like those of the latter group.

Another fact considered was that the larva of *Melanchroia* (*M. cephise* and *M. geometroides*), formerly associated with the Lithosiidæ, have been shown by Dewitz to be Geometrids. Another is the absence of a pair of legs in the Nolidæ, which I find must by their pupal and other characters be regarded as a distinct family from the Lithosiidæ. Still another fact is the conclusion I have arrived at that the Lithosiidæ have almost directly descended from the Tineidæ or an extinct group closely allied to them, and that from the Lithosiidæ have arisen not only the Dioptidæ (perhaps including *Phryganidia*), the Cyllopodidæ and Hypsidæ, but also the Syntomidæ and Nyctemeridæ, as well as the Arctiidæ.

On reexamining the larva, pupa and imago of *Phryganidia* (we have no knowledge of the transformations of the genuine Dioptidæ as at present limited); it has seemed to me that it has little of fundamental value to separate it from the Geometrid moths.

First as to the larva of *Phryganidia:* while in the shape of the head and the slender cylindrical body it differs little from the genera. It is naked and suspended by a remarkably long cremaster; the end of the abdomen is otherwise peculiar. The head presents no vestigial characters; there being no trace of maxillary palpi, of paraclypeal pieces, or apparently of labial palpi. With a complete knowledge of all its stages, it is still difficult to assign it a definite position. When we know more about the Dioptidæ, where it probably belongs, the problem may approach a solution, but that its affinities are closely with the Geometridæ is shown by comparing the pupa with that of *Cleora*. In the general shape of the head, of the eyes, of the front, and especially of the abdomen, the resemblance is close; the peculiar shape and markings of the last three abdominal segments are nearly identical in both genera, though the cremaster of *Cleora* is much shorter.

In this connection reference should be made to the striking resemblance between the pupæ of *Oeta aurea* and *Cleora pulchraria*. To my great astonishment I find the pupa of *Cleora* has the same vestigial head-characters as *Oeta;* the general shape of the pupa is the same; the mode of dehiscence the same, the shape of the vertex and its mode of separating when the moth issues from the pupa case; also the shape of the eyes, of the peculiar clypeus and labrum, while the more pronounced vestigial characters are the labial palpi, forming a triangular area, and the large semi-detached paraclypeal pieces. *Cleora* shows that it is a more modern form in having no traces of a vestigial eye-collar (maxillary palpi) such as occur (though very slightly developed) in *Oeta*. The shape of the end of the body, with the cremaster, is much the same, the shorter cremaster of *Cleora* being an adaptation to its life in a slight open-work cocoon. In the peculiar markings of the 8th and 9th abdominal segments *Cleora* is more like *Phryganidia*.

Judging by the pupal characters, then, the Geometrids have directly descended from the Lithosiidæ, the latter, as I have satisfied myself, having directly orginated from the generalized Tineina.

The imago of *Phryganidia* appear not to differ much from those of the Dioptidæ to which it has been referred by Butler. I am unable to see any important differences between the Dioptidæ and Cyllopodidæ, though my material is scanty. In the slender body, shape of the head, and proportions of the clypeus, shape of antennæ and palpi, both of these families do not essential differ from *Melanchroia* which is now known to be a Geometrid, nor from the Geometrids themselves.

In its venation *Phryganidia* is nearly identical with that of a

Josia from Jalapa, Mexico, in my collection ; the peculiarity is the origin of veins II2 and III3 from a common stem, in which *Phryganidia* apparently differs from some if not all other Dioptidæ. But the venation of the Dioptidæ (including *Phryganidia*) and of the Cyllopodidæ is nearly identical with that of *Melanchroia*, and the latter is a true Geometrid in its venation, and in the shape of its larva, being a looper; of its pupa we know nothing. The venation of the Geometrids is very persistent. Hence I conclude that the day-flying usually bright colored Dioptidæ and Cyllopodidæ, as well as the Hypsidæ, are direct off-shoots from the Lithosian stem, and their general resemblance to such Lithosians as *Crocota* and *Eudule*, as well as *Ameria*, is based on real affinity. The day-flying habits of some Geometrids is also well known. The larva of *Euphanessa* is a Geometrid, but its moth has been usually associated with the Lithosiidæ, though its venation is Geometrid. Riley describes the larva of *Oeta aurea* as having "extremely small" anterior abdominal legs, the anal being much larger. Probably when we learn more of the transformations of the families we have mentioned it will be found that the presence or absence of certain abdominal legs will be found to be a secondary adaptational character. It is noticeable that the dull colored *Phryganidia* with only incipient clouds instead of bars and spots is a primitive form as regards markings.

After an examination of the pupal and imaginal characters of Geometrids, Dioptids, Hypsids and Syntomids it seems to me that all these groups represent more or less parallel lines of development which originated from the generalized Lithosiidæ, the latter, with the Zygænidæ, having sprung from generalized Tineina. The

DOMED BURROWS OF CICADA SEPTENDECIM.

By BENJAMIN LANDER.

In 1877 a remarkable phenomenon connected with the advent of the periodical Cicada -- the so-called seventeen-year "locust", (Fig. 1) was observed at Rahway, N. J. — On opening a cellar which had been closed up to the time that the pupæ (Fig. 2) issued from the ground, the floor was found to be studded with small, hollow, cone-like structures, built of mud, which had been constructed as extensions of Cicada burrows. The attention of Professor J. S. Newberry having been called to the circumstance he deemed it of such importance that he secured specimens, and obtained a detailed statement of the features of the case, signed by several leading citizens of Rahway, and published the account in the School of Mines Quarterly of Columbia College, Jan. 1886; and in a separate illustrated pamphlet. As the Professor made no mention of ever having seen like structures before, the inference is natural that he had not.* Indeed, so rare were they prior to the advent of the same brood in 1894, that few entomologists had seen them, and no accurate description existed. Last year, countless numbers of these hut-like domes were observed at various places.

On the fourth of May 1894, while in the woods on the summit of South Mountain, at Nyack, N. Y., I came upon a spot that had recently been burnt over. On this area I observed vast quantities of the Cicada structures, entirely closed, averaging about two and a half inches in height; the aggregation ending at the very edge of the burnt section. So thickly studded was the ground that often eight or ten would be found in the space of a square foot; in one case I counted twenty-three in such a space. Subsequent explorations showed that the Cicada city extended over an area of not less than sixty acres. Eight large aggregations were discovered by me on top of the Nyack hills and the Palisades, covering many acres, and one near a stone quarry at a lower elevation; none of them in a place subject to overflow. Later, when only the ruins of the domes remained, I visited two areas where large numbers had been found; one in ground thinly covering massive sandstone, and another hard by a quarry, where the top soil was thin. An account of the discovery was published in The New York Times, and in the Scientific American of Oct. 16th. I offered an attempt at an explanation of the mystery; a criticism of my theory appeared in the issue of Nov. 10th, and my reply in that of Nov. 27th; to all of which the reader is referred.

---

* Previously described and figured by Walsh and Riley (see Am. Ent., Vol. I, 1868, p. 65). Wm. B.

Hitherto it has been supposed that the object of these domed extensions was to protect the burrows from overflow of water, and that when found on high ground they had been built by pupæ that had inherited the instinct from ancestors that had lived in "low, wet places". But this theory has been completely overthrown by the fact that millions of domed burrows were found on the summits of lofty elevations, not "subject to overflow", at Nyack, and many other places visited, and none of the vast army of builders chose "low, wet places"; notwithstanding that the lower levels swarmed with the insects, the ground in many places having been honey-combed with their open burrows. One salient fact is worth a volume of generalizations; but further proof that the theory is untenable will be offered hereinafter.

The explanation I have advanced as to the cause of the interesting phenomonon is based on the fact that in order to be revived so much in advance of pupæ which later emerged from open burrows, the dome-builders must have been near enough to the surface to feel the vivifying effects of abnormal, unseasonable warmth. Of course it must be remembered that our sensation of warmth as to degree and that of the insects are two entirely different things.

In the Rahway case the features of abnormally high temperture (compared to that outside,) and shallow burrows are self-evident. The excavation had reduced the depth of the pupæ from the surface. The heat of the sun on the exterior of the enclosure side, and the radiation carried off by the breeze, prevented an early revival of the unsheltered pupæ; which at their proper season emerged from open shafts.

A somewhat similar case is where domed burrows were observed near Washington at a former advent, in a thick pine grove. Here, the protection from the wind by the deep, overhanging curtains of the evergreens, would prevent, in a measure, a too rapid waste of the diffused warmth; while the constant radiation by night of absorbed heat stored up by day among the thick foliage would tend to offset the loss from the ground; rendering the temperature like that in the cellar, practically the same, day and night; doubtless raising it enough over that in the exposed places outside (where the wind would act as a fan,) to supply sufficient warmth to revive the pupæ: it may be only a week or two before those not thus protected. This, of course, is assuming that the domed burrows were shallow — the pupæ nearer the surface than those outside, which might have been the case for one or more of several reasons: the insects might not have burrowed much or any below their root-supplies, from which they obtain subsistance, or from other causes which will be referred to later.

If this theory of unusual warmth and shallow burrows is to hold, the temperature at the time the millions of domes were built on the Nyack hills and the Palisades must have been far above normal, and the localities must have had features that would prevent deep burrowing It is susceptible of proof that these conditions existed. March of 1894 was unusually warm: the hottest March on the records of the New York weather Station, extending to 1870, and was 223 degrees in excess of normal. At Nyack it was even warmer, as shown by published records. Wild flowers blossomed a month ahead of their season. Even as far up as Poughkeepsie, where domed burrows were found, the recorded temperature was practically the same as at New York. A large part of the dome areas had been burnt over early in March. In these places the combined natural and accidental heat no doubt brought the pupæ speedily to the surface. Even where the leaves and underbrush had been burnt off the preceding Fall the heat of the sun would sooner penetrate the bare ground.

The Nyack hills and the Palisades are composed of massive rock; their summits ground off by glacial action. These heights are thinly covered with earth; the extreme elevations, more or less level, are, naturally, less covered than elsewhere. It was in such places that the domes abounded; those found over quarries and elsewhere, previously alluded to, were, like those in higher areas, personally examined by me, and all were found to be in shallow earth. This feature furnishes the second condition of the theory; the first is a matter of indisputable record.

Among the places where domed burrows were found in thin soil were Nyack; Upper Nyack; South Nyack; Grandview and Piermont; and on top of the Palisades near Alpine; Closter; Demarest; Cresskill; Englewood; New Durham and Fort Lee. Several of these areas had been burnt over.

A correspondent writes me that in a dome area observed by him the structures were built after a fire, as shown by their containing burnt twigs. But this is just what would occur after a fire: The builders would come in contact with them in their work and they would be incorporated. I have many such specimens. A professional entomologist who visited the same spot writes that the case I reported from Nyack to the New York Times (wherein it was stated that the ground had been burnt over before the domes were built,) so fitted to the one observed by him that he was inclined to think it was an account of the one he had seen, and that the name of the locality had in some way been changed. It is not claimed that fire is necessary to revive the pupæ; but it is evident that in some cases it has been effectual; in others the abnormal heat of the sun was sufficient.

Professor John B. Smith reports that the structures were found near a quarry at Newark, N. J., and at Port Jefferson, in later appear. Exactly such a case — open burrows among the domes, has been reported to me by a well known entomologist.

A unique illustration of the protective function of the dome is shown in a circumstance which occured during a former advent of the Cicadas. A scientist and writer on entomology informs me that some laborers in cutting through a bank laid open the burrow of a pupa: Soon after, "upon the fresh, vertical cutting there appeared one of these 'huts' rising from the opening". Here was a *shallow burrow* (artificially so.)*prematurely opened;* the *undeveloped pupa* erecting a shield against the vicicitudes of external temperature; which would also serve as a protection against outside enemies: a perfectly logical analogism.

Perhaps enough substantiating facts have been adduced, but two features of the cases observed by me are so significant that they lend extreme probability to the explanation I offer, and certainly disprove the heredity theory. First: No open holes occured in the areas over the smooth glacial-worn rocks — there the soil was almost uniformally shallow; and it is beyond belief that what few "low ground" builders in the past that might have stolen horse-back rides to the mountain tops and the lofty Palisades, should have chosen just such prescribed places, and have utterly annihilated the open burrow builders — native to the soil. Second: A wide and deep gully (of course subject to overflow,) in the area of the largest Cicada city had no domed burrows, as there the earth was deep, from the alluvial deposits of ages, but later, when the great swarm arrived, this hollow was found to be honey-combed with open holes.

In conclusion, with reference to the causes and purposes of the domes, in view of what has been adduced it seems altogether likely that every one, no matter when or where observed, was erected by an undeveloped pupa that had prematurely opened its burrow from near the surface, and closed it as a protection while awaiting maturity.

Previous accounts erroniously state that these heretofore rare objects have an orifice at the surface of the ground. When the time for moulting arrives a hole is clawed through the roof (Fig. 3). A unique specimen in my collection shows the cast-off shell of a pupa firmly fixed in the opening: the hole had been made too small for entire emergence, but the little fellow had been able to escape from his horny armor. Many specimens show clear impressions of leaves (Fig. 4); proving that the fine clay or forest mould, worked with a cement exuded by the insect, was quite plastic. It would seem that the thin claws of the pupa were too inadequate for carrying very soft material. It may be that the little miner and mason is his own hod-carrier; conveying his load of plaster to the walls of his building on his head: a conjecture that would seem fanciful indeed were it not for the fact that the intelligent creature when burrowing downward, does what amounts to practically the same thing. Having displaced a pellet he cleverly places it on his head, and by a turn of his body carries the pellet to the earth above and presses it in.

From personal observations I am inclined to think that the structures are built at night; the builders beginning work at twilight, for the same reason that they choose that time to emerge from their burrows to moult; as the absence of the sun's heat in one case would prevent the exuding cement from drying, and keep the rim of the dome moist for cohesion; in the other the wings would not dry too rapidly for full expansion. Hoping that I might see the pupæ at work I broke off the tops of several domes, but after long watching observed no attempt at repairs. All but two or three were finally roofed over, but on the inside, considerably below the rim (Fig. 5); probably on account of being damper there, or that the pupæ could more readily prepare the inner wall for the masonry by smearing it with the adhesive cement. Among the multitude of domes a few were found that had been left unfinished. Doubtless the builders had been captured by crows, or other foragers. They afford an interesting illustration of the manner of placing the pellets on the rim. (Fig. 6.)

LOCAL ENTOMOLOGICAL NOTES.

Members of the New York Entomological Society and all others, are solicited to contribute to this column, their rare captures, local lists and other items of interest relating to the insect fauna of New York city and vicinity.

THE ODONATA OF NEW YORK STATE.

By PHILIP P. CALVERT, Philadelphia, Pa.

The object of the present paper is to extend our knowledge of the distribution of the dragonflies in New York State, by recording collections made by several persons, and by bringing together such data as have been previously published.

The literature treating of the New York Odonata exclusively, consists, as far as the writer is aware, of the following articles.

E. Emmons: Agriculture of New York, etc., . . together with descriptions of the more Common and Injurious Species of Insects. Vol. V, Albany: Printed by C. Van Benthuysen. 1854. (Being part of the Natural History of New York published by Authority). The Odonata are briefly referred to as the Libellulidæ on pp. 184—185, and illustrated in colors on plate 15. No explanation of these figures is given, other than that fig. 5 represents *Libellula pulchella* Drury, fig. *f* its larva and fig. 4 perhaps a variety. When I visited Cambridge in July, 1890, Dr. Hagen showed me a copy of this work in which he had identified these figures as follows. .Fig. 1. *Cordulia* (*Somatochlora*) *Lintneri* Hag. ♂. Fig. 2. *Gomphus brevis* Hag. ♂. Fig. 3. *Anax junius* Dru. ♂. Fig. 4. *Plathemis trimaculata* De Geer ♂, Fig. 5 id. ♀.

W. Beutenmüller: in Dragonflies *vs.* Mosquitoes (The Lamborn Prize Essays), New York, D. Appleton & Co., 1890, gives on pp. 163—164, a Preliminary Catalogue of the Odonata found in the State of New York. It consists of only names of 50 species, those found in the vicinity of New York City being marked with an asterisk. This catalogue is referred to below as (Be).

N. Banks: The Odonata of Ithaca, N. Y., in the Canadian Entomologist, xxvi, pp. 76—78. March, 1894. Forty-eight species from Ithaca and other localities are mentioned, with brief notes. Quoted below as (B).

W. T. Davis: Two additions to the local list of dragonflies in

Proceedings of the Natural Science Association of Staten Island, iv, pp. 52—53. December 8, 1894. (D).

A number of species are recorded from New York in papers of a more general scope, as mentioned below.

For the collections which are now first recorded, the writer is indebted to —

Mr. J. Percy Moore, who gave specimens from Lake St. Regis, Franklin Co., and Hotel Champlain, taken in September, 1890, quoted below as (M);

Mrs. A. T. Slosson, who sent dragonflies from various localities, as indicated by (Sl);

Mr. G. D. W. Williamson, who made collections at Dobb's Ferry in 1888 (W);

Mr. W. Sheraton, who collected in Keeseville, Essex Co., in 1894 (S).

A few specimens taken by the writer at Saratoga Lake in August, 1889, are included (C).

Finally, some data are derived from the collections of the American Entomological Society (A. E. S.)

Mr. Sheraton also sent some notes on the general character of the localities near Keeseville at which his collections were made, and which are here reproduced.

"As to the dragonflies, they were all obtained along a section, of the length of about a mile, of a small and rather sluggish brook flowing from Auger Lake by an extremely circuitous and tortuous course to the Au Sable river. The section in which the collecting was done includes, first a rough pasture field, the brook in this part being pretty thickly bordered on one side by alders, I found them to differ considerably from "locality 1", 1st, in the much greater abundance of the form marked No. 31 [*Hetærina americana*], and 2nd, in the absence of many forms found in locality 1, especially of the larger forms as No. 14 [*Libellula pulchella*]. The difference, I imagine, was chiefly, if not entirely, due to the presence in locality 1 of the clay-holes. Had my health been better than it was this summer, and the weather less intensely hot, I might have visited a number of other localities, and obtained, I think, a better collection. One thing that struck me rather forcibly was the fact that in the summer of 1893, when I was around the brook to some extent for other purposes, a large dragonfly with body of a brilliant metallic green was very numerous and conspicuous along the whole length at least of locality 1, while this year, with the exception of a single specimen which I think I saw one day when out driving, they were absolutely lacking wherever I went. Another thing that I noticed is that the larger dragonflies seldom make their appearance as early in the morning as the smaller forms, these latter being quite numerous between 9 and 10 of a bright morning, while the big ones, or at least those marked 12 and 14 [*Libellula pulchella*], seldom appeared until near 11 in the part where I was collecting. I was unable to procure any immature forms".

The list of species derived from all the sources above mentioned comprises 85, if not 86, species. The aim has been to give the precise locality in each case. Where this is not possible, and merely the State can be quoted, the place of original record has been given. Species not previously mentioned as from this State in the above cited papers, or in the catalogues of American Odonata of Hagen 1875 and of Banks 1893, are marked by an asterisk (*). The arrangement of the species is the same as in the writer's Catalogue of the Odonata of the vicinity of Philadelphia (Trans. Am. Ent. Soc. xx, pp. 219—272, 1893), in which the majority of the following species are described.

Subfamily CALOPTERYGINÆ.

1**Calopteryx maculata** *Beauvois.*

One male, Keeseville, June 9, 1894. "Seemed very rare. The only specimen I obtained was picked out of the grass by the brook, in a limp condition, when the grass was wet. I never again saw this form, except a few times in June, flying about the grounds of

'Clawbonny'. when no net was at hand" (S). Westchester Co., New York (Be). Ithaca, common about streams in spring and summer (B).

*2. **Calopteryx æquabilis** *Say.*

Keeseville, one female, Aug. 4, 1894.

3. **Calopteryx dimidiata** *Burm.*, race **apicalis** *Burm.*

Westchester Co., New York (Be).

*4. **Calopteryx amata** *Hagen.*

One male, Keene Valley, Essex Co., July 4, 1890, N. Y. St. Coll., sent to me for identification by Dr. Lintner, apparently belongs here, but differs from Hagen's description (Psyche, v, p. 244) as follows: General color brassy green instead of brassy blue; the small yellow band on the side of the thorax is on the second instead of the first suture; wings 7 mm. wide at nodus, instead of 9 mm; 7- -8 quadrilaterals.

5. **Hetærina americana** *Fabr.*

Keeseville, three males, six females, Aug. 10, 16, 1894 (S). Ithaca, one specimen (B).

Subfamily AGRIONINÆ.

6. **Lestes eurina** *Say.*

Dobb's Ferry, three males, July 7, 10, 23, 1888 (W).

7. **Lestes congener** *Hagen.*

11. **Lestes forcipata** *Rambur* (*hamata* HAGEN, 1861).

New York City (Be). Ithaca, not comon, June (B).

12. **Lestes rectangularis** *Say.*

Dobb's Ferry, three males, one female, July 10, 23, 1888 (W). New York City (Calverley—Hagen 1861). Ithaca, common during July and August (B). Saratoga Lake, Aug. 15, 1889 (C).

13. **Argia putrida** *Hagen.*

Niagara, one male (Sl). Ithaca, common, summer (B).

14. **Argia violacea** *Hagen.*

Keeseville, eleven males, July 6, Aug. 1, 4, 1894 (S). Dobb's Ferry, July 7 to Aug. 15, 1888 (W). Ithaca, common, July (B).

15 **Argia bipunctulata** *Hagen.*

"New York", Banks, Trans. Am. Ent. Soc., Vol. xix, p. 349.

16. **Erythromma conditum** *Hagen.*

Ithaca, one specimen (B).

17. **Nehalennia irene** *Hagen.*

Ithaca, uncommon, July (B). No specimens of *N. posita* appear to have been recorded from his State, although it most probably occurs.

18. **Amphiagrion saucium** *Burm.*

Westchester Co., New York (Be). Ithaca, one specimen (B).

19. **Enallagma cyathigerum** *Charp.*, var. **annexum** *Hag.*

Keeseville, one male, June 12, 1894. Ithaca, two specimens, August (B).

20. **Enallagma civile** *Hagen.*

Saratoga Lake, eight males, two females, Aug. 15, 1889 (C), see. Trans. Am. Ent. Soc., Vol. xx, p. 237.

21. **Enallagma** sp. n.

Niagara, two males, one female (Sl).

22. **Enallagma ebrium** *Hagen.*

Keeseville, thirteen males, eight females, June 9 to July 31, 1894 (S). Ithaca, two specimens (B). Catskill Mts., one male (A.E.S.).

23. **Enallagma Hageni** *Walsh.*

"A specimen in the Cornell Univ. collection is probably this species" (B).

24. **Enallagma traviatum** *Selys.*

Long Island. one specimen (B).

25. **Enallagma aspersum** *Hagen.*

Dobb's Ferry, four males, July 7, 10, 1888 (W). New York (Be).

26. **Enallagma divagans** *Selys.*

Long Island (B).

27. **Enallagma exsulans** *Hagen.*

Keeseville, abundant, June 12—Aug. 10, 1894 (S). Saratoga Lake, Aug. 15, 1889 (C). Ithaca, quite common, July, August (B).

28. **Enallagma signatum** *Hagen.*

"New York", Banks, Trans. Am. Ent. Soc., Vol. xix, p. 350.

29. **Ischnura verticalis** *Say* (*Ramburii* HAGEN, 1861).

Niagara (Sl.). Keeseville, abundant, June 9—Aug. 10, 1894 (S). Dobb's Ferry, July 7, 10, 1888 (W). Saratoga Lake, Aug. 15, 1889 (C). New York (Be). Ithaca, common, July, August (B).

30. **Ischnura Ramburii** *Selys.* (*iners* HAGEN, 1861).

"New York" (Hagen. 1861).

31. **Anomalagrion hastatum** *Say.*

Keeseville, one *black* female, July 31, 1894 (S). New York (Be).

36. **Gomphus brevis** *Hagen.*

"Schoharie, le male pris par M. Lintner" (Selys, Bull. Ac. Belg. — 2 — xlvi, p. 464, 1878). Emmons, *l. c. supra*, pl. 15, f. 2.

37. **Gomphus exilis** *Selys.*

Keeseville, one male, June 6, 1894 (S). Ithaca, quite common in June and July (B).

38. **Gomphus spicata** *Hagen.*

"Un male pris à New-York par M. Schaum" (Selys Mon. Gomph., p. 155, 1858). "New York, d'après un male adulte envoyé par M. Asa Fitch" (id., p. 414).

39. **Gomphus fraternus** *Say.*

Ithaca, one specimen (B).

40. **Gomphus adelphus** *Selys.*

Bethlehem, Albany Co., June 17 (Selys, Bull. Ac. Belg. — 2 — xlvi, p. 457).

41. **Gomphus villosipes** *Selys.*

Ithaca, not uncommon (B).

42. **Gomphus vastus** *Walsh.*

"New York" (Hagen 1875). Banks also mentions a female in the Cornell Univ. collection, of a species of *Gomphus* unknown to him.

43. **Dromogomphus spinosus** *Selys.*

Ithaca (probably), Baldwinsville by Mr. R. H Pettit (B).

Subfamily CORDULEGASTERINÆ.

*44. **Cordulegaster diastatops** *Selys.*

"New York", three males (A. E. S.)

Sub-family AESCHNINÆ.

45. **Epiæschna heros** *Fabr.*

Dobb's Ferry, one female, Aug. 10, 1888 (W). New York, common (Be). Ithaca, in Cornell Univ. collection, June (B).

46. **Fonscolombia vinosa** *Say.*

Keeseville, one female, July 30, 1894, kitchen at 'Clawbonny' (S). Ithaca, one specimen, July 29 (B). Westchester Co. (Be).

*47. **Basiæschna janata** *Say.*

Keeseville, one male, June 9, 1894 (S).

48. **Aeschna juncea** *L.*, var. **verticalis** *Hagen.*

"New York (Be).

49. **Aeschna clepsydra** *Say.*

Lake St. Regis, Sept. 5 to 22, 1890, abundant (M). Ithaca, uncommon, August (B). Catskill Mts., two males, Aug. 28, by E. M. Aaron (A. E. S.)

50. **Aeschna constricta** *Say.*

Hotel Champlain, one male, Sept. 21, 1890 (M). Watkin's Glen, one male (Sl.). Dobb's Ferry, Aug. 24, Sept. 14, 1888 (W). New York City (Be). Ithaca, common during July and August (B). Catskill Mts.. one male, one female, Aug. 28, by E. M. Aaron (A. E. S.).

51. **Anax junius** *Drury.*

Ithaca, common during summer (B). Emmons, pl. 15, f. 3. Vicinity of N. Y. City, common (Be).

Subfamily CORDULINÆ.

52. **Didymops transversa** *Say.*

Keeseville, one male, June 9, 1894 (S). Ithaca, uncommon, June, July (B).

53. **Epicordulia princeps** *Hagen.*

Ithaca, in Cornell Univ. collection, June (B).

54. **Tetragoneuria cynosura** *Say.*

Ithaca, common in the spring (B). Lake George, one male (A. E. S.).

55. **Tetragoneuria semiaquea** *Burm.*

Ithaca (probably), Baldwinsville by Mr. Pettit (B).

56. **Neurocordulia Uhleri** *Selys.*

"New York" (Be).

Subfamily LIBELLULINÆ.

62. **Tramea carolina** *Linn.*
Vicinity of New York City (Be). Not common.

63. **Tramea lacerata** *Hagen.*
Freeville, two specimens, May 31, 1889 (B).

64. **Libellula basalis** *Say.*
Dobb's Ferry, July 13, 1888 (W). Ithaca, uncommon, Aug. (B).

65. **Libellula auripennis** *Burm.*
Vicinity of New York City (Be).

66. **Libellula plumbea** *Uhler.*
Westchester Co., New York (Be).

67. **Libellula cyanea** *Fabr.* (*quadrupla* SAY.)
Vicinity of New York City (Be).

68. **Libellula axillena** *Westw.*, form **vibrans** (*Fab.?*) *Kirby.*
Staten Island (D), Westchester Co. (Be).

*69. **Libellula exusta** *Say.*
Lake George, one male (A. E. S.).

70. **Libellula quadrimaculata** *Linn.*
Vicinity of New York City (Be). Ithaca, a few specimens in the Cornell Univ. collection (B).

71. **Libellula semifasciata** *Burm.*
Dobb's Ferry, July 13, 1888 (W). Vicinity of New York (Be). Common.

72. **Libellula pulchella** *Drury.*
Keeseville, three males, two females, July 4—Aug. 4, 1894, very difficult to catch though numerous (S). Dobb's Ferry, June, July 7 (W). New York City (Be). Ithaca, common during spring and summer (B).

73. **Plathemis trimaculata** *De Geer.*
Dobb's Ferry, June (W). New York City and vicinity (Be). Ithaca, common during spring and summer (B). Emmons, pl. 15, f. 4 (♂), 5 (♀), f (larva).

74. **Micrathyria berenice** *Drury.*
Thousand Isles, one male (Sl). Vicinity of New York City (Be). Common.

75. **Nannothemis bella** *Uhler.*

Westchester Co., New York City (Be).

76. **Celithemis elisa** *Hagen.*

Long Island, New York (Be). Ithaca, one specimen by Prof. Morgan (B).

Celithemis ornata RAMBUR is to be looked for.

77. **Celithemis eponina** *Drury.*

Westchester Co., New York (Be). Not common.

78. **Leucorhinia intacta** *Hagen.*

Keeseville, ten males, July 4, 31, 1894 (S). Ithaca, not uncommon in the spring (B). Westchester Co. (Be).

79. **Diplax rubicundula** *Say.*

Lake St. Regis, two females, Sept 14, 1890 (M). Keeseville, one male, July 4, one female, July 26, 1894 (S). Dobbs Ferry, July 13, 1888 (W). Vicinity of New York City (Be). Ithaca, common during spring and summer (B).

Diplax obtrusa HAGEN probably lives in New York.

80. **Diplax semicincta** *Say.*

Ithaca, uncommon, August (B). Staten Island (D), Westchester Co. (Be).

81. **Diplax costifera** *Hagen.*

"New York" (Hagen, 1875).

82. **Diplax vicina** *Hagen.*

Lake St. Regis, six males, five females, Sept 17, 22, 1890 (M).

JOURNAL
OF THE
New York Entomological Society.

Vol. III. JUNE, 1895. No. 2.

NOTES AND DESCRIPTIONS OF TACHINIDÆ.

By D. W. COQUILLETT, Washington, D. C.

The forms referred to in the present paper belong to the Tachinidæ in which the apical cell terminates at or near the tip of the wing, the fourth vein is entire, eyes bare, the proboscis beyond its basal articulation shorter than height of head, palpi well developed, abdomen bearing true macrochætæ.

The genera mentioned below separate as follows:

First vein bristly.
  Fifth vein also bristly .... **Gymnoparela** *B. and B.*
  Fifth vein bare
    Face perpendicular, third vein bristly over half way to the small crossvein **Lasioneura** n. gen.
    Face strongly retreating, third vein bearing only two or three bristles near the base .... **Chætophleps** n. gen.
First vein bare.
  Palpi flattened, unusually dilated, wider than the proboscis, over one-third as broad as long .... **Lispidea** n. gen.
  Palpi cylindrical, sub-clavate, less than one-fourth as broad as long.
    Antennæ only half as long as the face .... **Clytiomya** *Rond.*
    Antennæ nearly or quite as long as the face.
      Third vein bristly at least two-thirds of the distance to the small crossvein .... **Thryptocera** *Macq.*
      Third vein at most bristly on its basal third.
        Facial ridges bristly on more than the lower half.
          Sides of face bristly above lower end of eyes. **Admontia** *B. and B.*
          Sides of face bare .... **Pseudomyothyria** *Town.*
        Facial ridges never bristly to the middle.
          Penultimate joint of arista over twice as long as broad, **Clausicella** *Rond.*
          Penultimate joint scarcely or not longer than broad.
            Sides of face pilose, each nearly half as wide as the median depression .... **Crytomeigenia** *B. and B.*
            Sides of face bare, each less than one-fourth as wide as the median depression .... **Hypostena** *Meig.*

Gymnopareia *B. and B.* To this genus belongs *Thryptocera americana* Town.

Lasioneura, n. gen.

Front at vertex one-fourth wider than either eye, frontal bristles descending about to base of second antennal joints, two pairs of orbital bristles in both sexes; face perpendicular, lower part of head slightly longer than at base of antennæ, sides of face bare, each about one-fourth as wide as the median depression, the latter not carinate in the middle; ridges nearly straight, moderately diverging, their lower ends widely separated; vibrissæ stout, inserted near the oral margin, only two or three small bristles above each; cheeks from one-fourth to one-third as broad as height of eyes. Antennæ nearly as long as the face, the third joint three or four times as long as the second; arista pubescent, the penultimate joint about as long as broad. Eyes bare. Proboscis beyond the basal articulation shorter than height of head; palpi well developed, sub-clavate. Abdomen oval, of four segments which are sub-equal in length, macrochætæ only marginal; genitalia slightly protruding in the male, hidden in the female. Hind tibiæ not ciliate. First vein partly or wholly bristly, third bristly over half way to the small crossvein, the others bare; apical cell open at tip of wing, hind crossvein about midway between the small crossvein and the bend, the latter arcuate, last section of fifth vein about one-fifth as long as the preceding section. Type:

Lasioneura johnsoni, sp. nov.

♂—Front and face yellow, vitta next the antennæ four times as wide as either side of front. Proboscis black, palpi yellow. Antennæ black, the first two joints yellow; arista thickened on the basal three-fifths. Thorax black, gray pollinose, marked with two brown vittæ, three post sutural bristles; scutellum black, two pairs of long marginal macrochætæ. Abdomen black, the broad lateral margins of the first two segments and front angles of the third, yellow; shining excepting the gray pollinose bases of the last three segments; first segment destitute of dorsal macrochætæ, second with a marginal pair, third and fourth each with a marginal row very short apical pair of macrochætæ. Ten macrochætæ in the marginal row on the third abdominal segment. Coxæ destitute of spines. Wings grayish hyaline, first vein bristly on its apical third, the third bristly on nearly its entire length. Length 5 mm.

New Hampshire. Four specimens in the National Museum.

Chætophleps, gen. nov.

Front of female at vertex slightly wider than, in the male as wide as, either eye, frontal bristles descending about to tip of second antennal joint, two pairs of orbital bristles in both sexes; face strongly receding, sides bare, each about one-tenth as wide as the median depression, the latter with a low carina in the middle-ridges strongly diverging, their lower ends widely separated, vibrissæ strong, inserted near the oral margin, ridges bristly on slightly over their lower half, cheeks less than one-fifth as broad as the eye-height. Eyes bare. Antennæ about as long as the face, the third joint over four times as long as the second; arista pubescent, thickened to the middle, the penultimate joint scarcely longer than broad. Proboscis beyond the basal articulation shorter than height of head, palpi clavate, well developed. Abdomen elongate oval, its four segments in the female sub-equal in length, in the male with a fifth segment half as long as the fourth, macrochætæ of second and third segments discal and marginal in the female, only marginal in the male. First vein bristly at least on its apical half, the third bearing a few bristles at its base, the others bare; apical cell open or short petiolate, terminating near the wing-tip; hind crossvein nearly perpendicular, about midway between the small crossvein and the bend, the latter arcuate. Hind tibiæ not ciliate. Type:

Chætophleps setosa, nov. sp.

♂, ♀.—Head black, frontal vitta next the antennæ sub-equal in width to either side of the front. Antennæ and proboscis black, palpi yellow, third antennal joint of nearly an equal width, four times as long as wide. Thorax black, the sides and a median vitta in front of the suture, whitish pollinose, three post-sutural macrochætæ; scutellum black, bearing three long marginal pairs of macrochætæ. Abdomen shining black, bases of the segments except the first narrowly whitish pollinose; first segment in the female bearing a marginal pair, the second with a discal and a marginal pair, the third with a discal pair and a marginal row of ten, fourth with a discal pair, a discal lateral and a marginal row of six macrochætæ; in the male the discal macrochætæ are wanting. Legs black, wings hyaline, calypteres whitish. Length 4 mm.

Maryland. One pair captured by the writer in June.

Lispidea, gen. nov.

Front of female at the vertex about one-half wider than either eye, frontal bristles descending about to middle of second antennal joint, two pairs of orbital bristles in the female, face perpendicular, lower part of head nearly as long as at the base of antennæ; sides of face bare, each about one-ninth as wide as the median depression; vibrissac inserted near the oral margin, ridges bristly on the lower fourth, cheeks nearly one-third as wide as the eye-height. Antennæ as long as the face, the third joint two and one-half times as long as the second; arista thickened to the middle, the penultimate joint nearly half as long as the last one. Eyes bare. Proboscis beyond the basal articulation shorter than height of head; palpi flattened, unusually broad, widening from the broad base to the first third, then of nearly an equal width, scarcely over twice as long as wide, broader than the proboscis. Abdomen oval of four segments which are sub-equal in length, macrochætæ only marginal. Hind tibiæ not ciliate. Third vein with a few bristles at its base, the others bare; apical cell open at the wing-tip, hind crossvein nearly perpendicular, about midway between the small crossvein and the bend, the latter arcuate, last section of fifth vein about one-fourth as long as the preceding. Type:

Lispidea palpigera, sp. nov.

♀—Head black, frontal vitta next the antennæ sub-equal in width to either side of the front, face in profile evenly concave. Antennæ and proboscis black, labella large, yellowish, palpi yellow; third antennal joint slightly widening to the tip, twice as long as broad. Thorax black, gray pollinose, marked with four dark gray vittæ, three post-sutural macrochætæ; scutellum black, bearing two long and a shorter lateral, also a very small apical pair of macrochætæ. Abdomen black, basal half or more of the last three segments gray pollinose; first segment without, the second with a marginal pair, the third with a marginal row of eight, the fourth with a marginal row of six macrochætæ. Legs black, claws and pulvilli shorter than the last tarsal joint, front tarsi not dilated. Wings hyaline, calypteres whitish. Length 4 to 5 mm.

Illinois. Five specimens from Dr. W. A. Nason.

Clytiomyia *Rond.*

Rondani has called attention to the fact that *Clytia* Desv. (1830) is preoccupied by Lamarck in the Polyps (1812), and by Huebner in the Lepidoptera (1816), and proposes the above name for the present with a discal, row of ten. Claws and pulvilli much shorter than the last tarsal joint; front tarsi not dilated. Wings hyaline, costal and marginal cells, except base of the latter, yellow, a small deep black cloud on the small crossvein; third vein bearing four bristles at its base, the others bare; apical cell open slightly before the wing-tip, hind crossvein somewhat oblique, nearly midway between the small crossvein and the bend, the latter angular, apical crossvein strongly curved inward, small crossvein distinctly beyond apex of first vein; calypteres whitish. Length 5.5 mm.

Florida. A single specimen from Mrs. A. T. Slosson.

Clytiomyia exile, sp. nov.

♂—Differs from above description of *punctata* as follows: Occiput, thorax, scutellum and abdomen, except sometimes the sides of the first two segments, black; no black spot near base of costa nor on the small crossvein. Front at vertex less than one-third as wide as either eye, frontal bristles descending only to base of antennæ, vitta next the antennæ sub-equal in width to either side of the front, no orbital bristles; vibrissæ inserted at lowest third of face, not stouter than the bristles below them, cheeks one-half as broad as the eye-height. Antennæ having the third joint one-fourth longer than the second, one-third longer than broad. Thorax gray pollinose, marked with four blackish vittæ. Abdomen gray pollinose, macrochætæ of fourth segment in a marginal row of eight; genitalia protruding half the length of the fourth segment. Wings hyaline, tinged with yellowish, bend of fourth vein arcuate; hind calypteres yellowish. Length 6 to 8 mm.

New Hampshire (Mrs. Slosson) and Maryland. Two specimens.

Clytiomyia atrata, sp. nov.

♂—Differs from the description of *punctata* as follows: Wholly black except the palpi; no black spot near base of costa nor on the small crossvein. Eyes almost contiguous, vitta next the antennæ sub-equal in width to either side of the front, cheeks one-third as broad as the eye height, no orbital bristles; vibrissæ not stouter than the bristles below them, inserted at lowest third of the face. Third joint of antennæ one-fourth longer than the second, one-third longer t an broad. Proboscis slender, the last section three-fourths as long as height of head, labella small. Thorax grayish pollinose, with four blackish vittæ. Abdomen whitish pollinose, macrochætæ of fourth segment in a marginal row of eight, genitalia slightly protruding. Wings pure hyaline, extreme base yellowish, only a single bristle at base of the third vein, fourth vein arcuate at the bend. Length 7 mm.

Washington. A single specimen from Prof. O. B. Johnson.

Thryptocera *Macq.*

In their work on the Muscidæ Calypterata (Zweif. Kais. Museums Wien, iv., p. 102, and vi., p. 150), Brauer and Bergenstamm erroneously credit this genus to Meigen; it was first described by Macquart (Hist. Nat. Dipt., II., pp. 87–88, 1835). Meigen's re-description appeared three years later (Syst. Besch., VII., p. 242, 1838), and he correctly credits the genus to Macquart. Brauer and Bergenstamm commit another error in giving as the type of this genus the *Tachina latifrons* Meigen, a species neither described nor mentioned by Macquart at the time of establishing this genus, and hence cannot by any possibility be regarded as the type of this genus. Macquart accompanied his description with a figure of *Tachina bicolor* Meigen, and expressly refers to it at the end of the description; this species, therefore, must be the true type of *Thryptocera*. In accordance with these facts I have given this genus the place it occupies in the above table, and refer the following species to it:

Thryptocera dunningii, sp. nov.

♀—Head black, front at vertex broader than either eye, vitta next the antennæ sub-equal in width to either side of the front, frontal bristles descending nearly to tip of second antennal joint, two pairs of orbital bristles; sides of face bare, each one-ninth as wide as the median depression; vibrissæ inserted near the oral margin, ridges bristly on lowest third, cheeks one-seventh as broad as height of eyes. Antennæ black, as long as the face, third joint three times as long as the second; arista thickened on the basal third, the penultimate joint slightly longer than wide. Proboscis black, the last section much shorter than height of head, labella and palpi yellow. Thorax and scutellum black, lightly blueish white pollinose, three post-sutural macrochætæ; scutellum bearing three long lateral and a scarcely smaller apical pair. Abdomen shining black, base of the third segment white pollinose; first segment destitute of dorsal macrochætæ, second with a marginal pair, third with a marginal row of eight, fourth with a marginal row of six; genitalia sub-cylindrical, sometimes protruding three-fourths of the length of the fourth abdominal segment. Legs black, claws and pulvilli much shorter than the last tarsal joint. Wings hyaline, third vein bristly almost or quite to the small crossvein, the others bare, apical cell open slightly before the wing-tip, hind crossvein near last third of the distance between the small [redacted] broad. Thorax gray pollinose, marked with four black vittæ, three post sutural macrochætæ; scutellum bearing three long lateral and a minute apical pair. Abdomen shining, narrow bases of last three segments white pollinose; first segment with a marginal pair of macrochætæ, second with a discal and marginal pair, third with a discal pair and a marginal row of ten, the fourth with a discal and sub-marginal row of eight each. Hind tibiæ sub-ciliate, claws and pulvilli much shorter than the last tarsal joint, front tarsi noticably broader than the middle ones. Wings grayish hyaline, third vein bearing a few bristles at the base, the others bare, apical cell open or closed in the margin almost at the wing-tip, hind crossvein nearly midway between the small crossvein and the bend, the latter arcuate.

♂ Same as the ♀ with these exceptions: Third joint of antennæ seven times as long as the second, arista thickened on the basal four-fifths, the penultimate joint over twice as long as broad, front tarsi only slightly wider than the middle ones. Length 5 to 8 mm.

Dist. Columbia. One male and five females, two of which were collected by Mr. Th. Pergande, for whom the species is named.

Admontia nasoni, sp. nov.

♀—Differs from the above description of *pergandei* only as follows: Palpi, basal half of arista and extreme base of third antennal joint, yellowish. Front at vertex one-half broader than either eye, frontal bristles descending only to base of second antennal joint. Wings whitish at base, dark brown beyond the small crossvein, the portion behind the fifth vein, and behind the last section of the fourth vein, hyaline, a hyaline spot in apices of submarginal, first posterior and of the discal cell; only one bristle at base of third vein. Length 7 mm.

Illinois. A single specimen from Dr. W. A. Nason, after whom this handsome species is named.

Pseudomyothyria tortricis, sp. nov.

♀—Head black, front at vertex one-third broader than either eye, vitta next the antennæ three-fourths as wide as either side of front, frontal bristles descending to base of third antennal joint, two pairs of orbital bristles; face in profile slightly convex, the sides bare; ridges bristly to slightly above the middle, cheeks one-third as broad as the eye-height. Antennæ black, nearly as long as the face, third joint slightly over three times as long as the second, slightly widening to the apex; arista thickened on basal third, penultimate joint shorter than broad. Proboscis black, last section not half as long as height of head, palpi yellow. Thorax and scutellum black, whitish pollinose, thorax with indications of four black vittæ, three post sutural macrochætæ; scutellum bearing three long lateral and a very small apical pair of macrochætæ. Abdomens shining black, bases of last three segments white pollinose; first segment destitute of dorsal macrochætæ, second with a discal and marginal pair, third with a discal pair and marginal row of ten, the fourth with a discal row of ten and a submarginal row of six. Legs black, claws and pulvilli shorter than the last tarsal joint. Wings hyaline, third vein with a few bristles at base, the others bare, petiole of apical cell nearly half as long as the hind crossvein. Length 5.5 mm.

Southern California. A single specimen bred August 15, 1890, from a Tortricid (?) larva that lives in a nest formed by fastening several leaves together, on *Solanum douglassi.*

Clausicella tarsalis, sp. nov.

♀—Head black, front at vertex one-half wider than either eye, vitta next the antennæ sub equal in width to either side of the front, frontal bristles descending about to middle of second antennal joint, two pairs of orbital bristles; face perpendicular, in profile evenly concave, the sides bare, each one-ninth as wide as the median depression, ridges bristly on the lower fourth; cheeks nearly one-third as broad as the eye-height. Antennæ black, as long as the face, the third joint two and one-half times as long as the second, twice as long as broad; arista thickened to slightly beyond the middle, the penultimate joint nearly half as long as the last one. Proboscis black, the last section three-fourths as long as height of head, palpi black, sub-clavate. Thorax black, gray pollinose, with four dark vittæ, three post-sutural macrochætæ; scutellum black, bearing two long and a short lateral, also a very small apical pair of macrochætæ. Abdomen shining black, bases of the last three segments white pollinose; first segment without dorsal macrochætæ, second with a marginal pair, third with a marginal row of eight, the fourth with a marginal row of six. Legs black, claws and pulvilli shorter than the last tarsal joint, front tarsi much wider than the middle ones. Wings hyaline, third vein with a few bristles at the base, the others bare, apical cell open at the wing-tip, hind crossvein nearly perpendicular, about midway between the small crossvein and the bend, the latter arcuate. Length 3 mm.

Illinois. A single specimen from Dr. W. A. Nason.

Clausicella antennalis, sp. nov.

♂—Differs from the above description of *tarsalis* only as follows: Third joint of antennæ five times as long as the second, greatly broadening to the apex

Hypostena variabilis, sp. nov.

♀—Head black, front at vertex slightly broader than either eye, vitta next the antennæ sub-equal in width to either side of the front, frontal bristles descending to tip of second antennal joint, two pairs of orbital bristles; face in profile strongly convex, the sides bare, ridges bristly on lower two-fifths or less, vibrissæ inserted at the oral margin; cheeks one-fourth as broad as the eye-height. Antennæ black, nearly as long as the face, the third joint about four times as long as the second, nearly four times as long as broad; arista thickened on the basal third, the penultimate joint broader than long. Proboscis black, the portion beyond the basal articulation much shorter than height of head, labella yellowish; palpi clavate, yellow. Thorax black, gray or yellowish pollinose, with four black vittæ, three post-sutural macrochætæ; scutellum black, with three pairs of long marginal macrochætæ and sometimes a very small apical pair. Abdomen black, bases of last three segments grayish pollinose; first segment with a marginal pair of macrochætæ, second with a marginal and usually a discal pair, third with a marginal row of eight and usually a discal pair, fourth with a discal row of eight and a sub-marginal row of six. Legs black, claws and pulvilli much shorter then the last tarsal joint. Wings hyaline, third vein bearing a few bristles at the base, the others bare; apical cell ending slightly before the wing-tip, open or closed in the margin, hind crossvein nearly midway between the small crossvein and the bend, the latter arcuate, small crossvein slightly beyond the middle of the discal cell.

♂—Differs from the in ♀ having the front only as broad as either eye, no orbital bristles, and the claws and pulvilli of front tarsi as long as the last tarsal joint. Length 4.5 to 6.5 mm.

Illinois (Dr. Nason), New Hampshire (Mrs Slosson) and Maryland. One male and fourteen females, June to September.

Hypostena barbata, sp. nov.

♂—Same as the above description of *variabilis* with these exceptions: Front equal to either eye, vitta next the antennæ one-fourth wider than either side of front, face in profile convex on upper part, concave below, ridges bristly almost to the middle. Palpi black. Discal pair of macrochætæ on the second and third abdominal segments always present.

♀—Differs from the ♂ as follows: Front scarcely over half as wide as either eye, vitta not wider than either side of front, no orbital bristles, face evenly concave, claws and pulvilli as long as the last tarsal joint. Length 5 mm.

New Hampshire and Southern California. Two males from the former locality, received from Mrs. Slosson, and two females from the latter locality, taken by the writer in March.

Hypostena ænea, sp. nov.

♀—Differs from the above description of *variabilis* as follows: Face in profile strongly concave, only one or two bristles above each vibrissaæ. Third joint of antennæ only three times as long as broad, greatly widening to the apex; arista thickened on the basal three-fourths, the penultimate joint slightly longer than broad. Palpi black. Scutellum bearing only two pairs of long marginal macrochætæ. Abdomen shining black with a bronze luster, bases of second and third segments narrowly white pollinose; first segment destitute of dorsal macrochætæ, the second and third destitute of discal ones. Apical cell open at the wing-tip. Length 4 mm.

Southern California. A single specimen, in March.

Hypostena pusilla, sp. nov.

♀—Differs from *variabilis* as follows: Front two-thirds as wide as either eye, face slightly concave. Third joint of antennæ nearly three times as long as the second, only twice as long as broad. Palpi black. Apical cell open at the wing-tip. Length 3 to 4 mm.

Illinois (Dr. Nason) and Southern California. Three specimens.

Hypostena degeerioides, sp. nov.

♀—Same as *variabilis* with these exceptions: A row of short, black, bristly hairs extends just outside the facial ridges, from frontal bristles to lower end of eyes; cheeks nearly half as broad as the eye-height. Third joint of antennæ nearly six times as long as broad; arista thickened nearly to the middle, the penultimate joint slightly longer than broad. Palpi black. Thorax shining except the whitish pollinose sides and a median vitta in front of the suture. The discal pair of macrochætæ present on the second and third abdominal segments, the discal row absent on the fourth. Front tarsi nearly twice as broad as the middle ones, the last joint shorter than the preceding. Wings grayish in front of the third vein, small crossvein at middle of discal cell. Length 6 mm.

Illinois (Dr. Nason) and District Columbia. Two specimens.

NOTES ON TWO CALLIMORPHAS.

By HARRISON G. DYAR.

Last Summer Dr. Lintner obtained eggs from some ♀ Callimorphas at Keene Valley in the Adirondacks, and gave them to me to raise. There proved to be two species, *lecontei* and *confusa*.

Haploa lecontei *Guerin.*

Egg.—Resembling the eggs of *confusa* but very pale yellow, and scarcely shining. Reticulations small, close, evident and rounded, casting shadows in the depressions; they differ chiefly from those of *confusa* in being deeper and smaller. Diameter .7 mm. The eggs failed to hatch, though the embryos advanced nearly to the point of biting the shell.

Haploa confusa *Lyman.*

Mr. Lyman has given descriptions of about four stages in Can. Ent., Vol. XIX., p. 186.

Egg.—Spherical with the base a little flattened, adherent; smooth, shining rather dark yellow; reticulations obscure, but becoming evident in certain lights, very narrow, linear, irregular, the meshes moderately large. Diameter .7 mm. Mr. Lyman does not mention the reticulations.

First Stage.—Head shining black over the apices of the lobes, but the whole clypeus pale yellowish; mouth brown; width .35 mm. Body yellowish, the cervical shield black, bisected; warts very large, shining black, each with a single long seta. The arrangement is not exactly that of the mature larva as Mr. Lyman states, because wart vi is lacking. Wart iv is situated directly behind the spiracle, as near to iii as to v. A long seta on the leg-plate.

Second Stage.—Head, cervical shield, anal plate, warts and legs shining black; body whitish with a broad brown dorsal band, extending to wart iii, but paler centrally so as to be almost reduced to two subdorsal bands. Hair black and white mixed, short, bristly; four or more hairs from each wart; wart vi present, elongate, as distinct as the the others. Width of head .5 mm. Later, dorsally and laterally whitish, with a yellowish segmental mark just above wart iv; subdorsal bands slaty brown, connecting dorsally in the incisures.

Third Stage (interpolated stage?).—Head black, width .6 mm. A broad, irregular grayish white dorsal line; a blackish subdorsal band between ii and iii, rather irregular; a broad pale band over iv, marked with yellowish above each wart (iv); a grayish subventral shade over v. Warts and feet black; hair short, stiff, not very abundant, black and white mixed.

Fourth Stage (normal third?).—Head shining black; width .7 mm. Warts black; body brown black; a broad white dorsal line and very narrow subdorsal one (ii); a bright yellow stigmatal line indented a little by iii and iv, between which it runs. Hair short, bristly, inconspicuous, black and white mixed. Feet blackish; venter white in a broad stripe between the feet, interrupted only by black at wart viii on joints 5 and 6.

Fifth Stage (normal fourth?).—Head shining black, width 1.05 mm. Black, a rather broad dorsal line, straight, sordid white, becoming yellowish between warts ii; very narrow subdorsal and subventral, pale, obsolescent lines; a bright yellow stigmatal line, tsansversely streaked on the folds. Feet black, a broad, defined, pale ventral band, nearly white. Hair short, bristly.

Sixth Stage (interpolated stage).—Black; width of head 1.2 mm. A distinct yellow dorsal and stigmatal line, the latter the broader and composed of transverse streaks on the annulets; traces of a subventral band, whitish; warts large, hair very short but abundant, bristly, black. No subdorsal line, or the merest trace of one. Claspers of abdominal feet pale; venter white.

Seventh Stage (interpolated stage).—Head 1.3 mm. Black, head and warts shining, hair short, bristly. Dorsal line yellow, distinct; stigmatal line broken into four dots on each segment, the anterior and two posterior transverse and yellow, the second longitudinal and white;

ON THE FOOD HABITS OF CERTAIN DUNG AND CARRION BEETLES.

By CHARLES UPSON CLARK.

It is not generally known, I believe, that many of the beetles frequenting carrion and dung, feed to a greater or less extent on the maggots—fly larvæ—which they find therein. My attention was first called to this habit two summers ago. While collecting from a [redacted] dead woodchuck which teemed with specimens of *Silpha surinamensis*, I saw a fly seized by one of the beetles, held up in the air and sucked dry. Looking more closely, I discovered that the Silphas were feeding on maggots, not as I had always supposed, on decaying matter. By careful observations made since then at Charlemont, Mass., on beetles found on dead squirrels and woodchucks and in dung, I have come to the conclusion that these beetles may be roughly separated into three divisions, according to the character of their food.

In the first division—those which feed on the dung or carrion wholly—I would place the Scarabæidæ, *Copris*, *Trox*, *Geotrupes*, *Aphodius*, the *Trichopteryx* grade and *Cercyon* and allied genera. It is possible, of course, that these latter small beetles, some very minute, feed on microscopic larvæ, but they seemed to be feeding on the dung or carrion.

Then come those which feed on the maggots to a limited extent. Such are *Silpha americana* and *S. noveboracensis*, *Necrophorus*, *orbicollis*, *tomentosus* and *americanus*.

The third division comprises those which feed almost exclusively on larvæ. Here belong *Necrophorus marginatus*, *Silpha lapponica*, *S. surinamensis*, *Hister immunis*, *fœdatus*, *furtivus* and *depurator*, *Saprinus patruelis*, *Creophilus villosus*, *Listotrophus cingulatus*, *Staphylinus mysticus*, *fossator* and *Philonthus* sp. I have no doubt that the smaller Staphylinidæ so abundant in such situations are also animal feeders, though I could not take them in the act. *Clerus quadriguttatus* I have frequently taken devouring Scolytid larvæ, and I feel sure that *Necrobia*, *Thaneroclerus*, etc., will be found to feed on maggots.

I hope that collectors in other localities will send the JOURNAL their observations on this subject. I cannot believe that the habit has not been noticed before; but I can find no mention of it in the books I have consulted, and I believe that collectors generally have gone on the supposition that these beetles feed on the substances in which they are found.

NOTES ON A COLLECTING TOUR IN CONNECTICUT.

By R. L. DITMARS.

The Naugatuck River district of Connecticut is a collecting ground so rich in material that it seems queer to me, of it's not being mentioned more by our local collectors. For the last four years I have made short trips to the Capitol, Hartford, and hearing so much about the beautiful Naugatuck Valley, determined to spend my vacation in that district.

Last July found me in the heart of the Naugatuck Hills, at the little village of Greystone, about four miles from Waterbury. Here the hills are about 900 to 1,000 feet high, covered with a rich vegetation, and probably offer some northern forms in the line of Lepidoptera.

Besides being interested in entomology, I am also interested in herpetology, and was highly delighted when informed that the rattlesnake was found in this district, and it is a fact that where the deadly *Crotalus* is found, collecting is apt to be very good, as it shows that few have been in that locality. My first specimen taken in this district was a fine fresh specimen of *Smerinthus myops*, which flew into my window on the night I arrived.

The first few days were devoted to collecting in the valley, and here I noticed the larvæ of *Limenitis disippus* feeding on the willow. *Papilio asterias* and *troilus* were abundant, *turnus* more rare, only one variety *glaucus* was seen ; *P. cresphontes* was rare ; *Pieris rapæ* was not seen at all ; *Argynnis cybele* was very abundant, *idalia* rather scarce, *myrina* abundant, both in the valley and on the mountain side ; *Satyrus*

One day, while making my way up a little stream on a raft, I noticed that most of the *Hygrotrechus* were spotted with red, and seeing one of a bright vermillion color, dart off, determined at once to investigate, thinking that it might be a new insect. After capturing the insect, was very much surprised to find it covered with the larvæ of *Trombidium*. It is a common occurrence to find the *Trombidium* larvæ on numerous Orthoptera and Diptera, but to find them on an acquatic insect seemed truly remarkable, and especially so in this case, as the *Hygrotrechus* never leave the water to go on shore, and how the *Trombidium* larvæ became transfixed to such lively insects is a mystery.

SCENE ON MT. TOBY.

Orthoptera were exceedingly numerous; all day could be heard the sharp song of the *Orchelimum*; the Katy-did (*Platyphyllum concavum*) was absent, however, seeming to prefer the more level farm lands in the lower part of the state.

It was at Greystone that I first became acquainted with that remarkable and beautiful grasshopper, *Spharagemon saxatile*. It was on a trip up Mt. Toby, the highest of the hills. Ascending by way of an old logging path; occasionally a *Cicindela sexguttata* would run ahead a short distance and alight in the path again, only to repeat the performance on my coming up to him; when passing the clearings *Vanessa* *milbertii* would be seen, and offered a hard chase over the rough rocks. A beautiful species of *Eristalus* (*E. bastardi*), would occasionally be seen on the cardinal flowers, looking exactly like a brightly colored bee. On passing a pit of clay baked dry by the sun, I indifferently kicked over a loose piece, and underneath was a fine specimen of *Cychrus elevatus*; it surprised me to find a *Cychrus* in such a place, as there was no vegetation in the pit, which was very dry and offered no food for snails.

On up the mountain side an occasional *Thecla* and *Argynnis* would be seen. *Cicada canicularis* was making the woods ring with its sharp notes. When nearing the summit, on rather barren ground, a species of grasshopper, *Circotettix verruculatus*, was very abundant, rising by the dozen, and making a sharp crackling noise as it flew. Here an old rotten log which I stopped to investigate yielded 130 specimens of *Phenolia grossa*, and were at once named "turtle bugs" by the country boy with me.

At last on the summit, and there on the lichen-covered rocks was looking into the valley below and enjoying a magnificent view of the surrounding country. Hill after hill rose in wild confusion, covered with dense growth of fir and other trees. The enormous rock on which I stood sloped downwards in a dangerous incline to a ledge about four feet wide, from which was a precipice of fully three hundred feet, at the bottom of which began the thick woods of the mountain side.

Happening to glance at the ledge, there to my joy was the long looked for *Crotalus*. It lay tightly coiled with its long string of rattles elevated in the centre of its folds, the beautiful sulphur tints of its

A rather peculiar incident occurred while out after a woodchuck one day. Not seeing the animal after an hour's hunt, I took a shot at a passing swallow, and as it fell in front of me on level ground it disgorged what seemed to be a large berry, but on examining more closely, found it to be a ball of insects most of which were alive. It was composed of nearly a dozen winged ants, some gnats, two specimens of a small *Agrion*, five specimens of Chysomelidæ of three species, two *Casnonia* and some small Hemiptera. As some of the insects were good they were soon in my collecting bottle. Thinking that this might be an exception, I shot two more swallows, and both had the ball of insects in the mouth. The time was 6:30 p. m. This is the first time that I ever hunted insects with a gun.

When back in the city about two weeks, I noticed that one of the snakes caught during my vacation seemed to have an obstruction in the throat, and, on examining him, found the throat infested with what looked like dipterous larvæ of large size. Wishing to keep the snake alive, I removed them all with a pair of forceps and preserved them. The snake was *Heterodon platyrhinos*, popularly termed the "hog-nose," or "blowing adder," was nearly a yard long and at the thickest part of the body one and a quarter inches in diameter. This is the first time that I have heard of a dipterous parasite on Ophidia.

During my stay in Plymouth County I made several trips to adjacent towns, Reynold's Bridge offering good collecting, especially at an elevation. At Plymouth, high up among the hills, was a collector from Brooklyn; he informed me that he was doing good work in the Lepidoptera, particularly the Heterocera, and had some good Coleoptera on hand.

As a great deal of my time in this region was devoted to collecting venomous Ophidia, I had not the time to gather any large quantity of insects, but what work I accomplished in the entomological line showed the nature of this rich collecting ground.

To a collector having ample time to stay in any one place, the Naugatuck Valley offers fine collecting for the summer. Here along the Naugatuck River he may find both hill and valley collecting, and also stretches of pine growth.

The region is easily accessible from New York City by the N. Y., N. H. & H. R. R. to Bridgeport, thence by the Naugatuck Division.

TWO CALIFORNIA PHALANGIDS.

By NATHAN BANKS.

Eurybunus spinosus, sp. nov.

Length 7 mm.; femur I 3 mm. Grayish brown above, a blackish mark on each side of base of abdomen outlining a paler central stripe; sides and venter gray, minutely dotted with silvery; eye tubercle with a white stripe above; femora I and III brown, with a pale ring on middle; tibiæ I and III brown, mottled with pale; femora and tibiæ II and IV whitish, with irregular brown spots; all metatarsi pale, tarsi ringed with brown at false articulations; palpi pale, spotted with brown, black at tips. Eye-tubercle low, smooth; two small elevations on anterior margin of cephalothorax, but bearing no spinules; a transverse row of small spinules behind eye-tubercle; about eight transverse rows of spinules on the abdomen; femora and patellæ tipped with some spinules; legs and palpi clothed with short stiff black bristles; no false articulation in metatarsus I, one in tibia II; last joint of palpus straight, once and one-half as long as preceding joint, palpal claw without teeth.

Habitat: Los Angeles, California.

Mitopus californicus, sp. nov.

Length 7 mm.; femur I, 4 mm. Grayish above, indistinctly mottled with white and brown; vase-mark not distinct; femora and tibiæ with brown bands near base and tip. Some spinules grouped in front, and some on each side of cephalothorax eye-tubercle about its diameter from anterior margin, two rows of spinules above; basal joints of legs with five rows of prominent spinules; and a row on each segment of the body; palpi short, last joint slightly curved, longer than three plus four, palpal claw smooth; no false articulations in any tibiæ, one in metatarsus I; tibia II much longer than metatarsus II.

Habitat: Los Angeles, California.

Similar to the eastern *M. montanus* Banks, but not so strikingly marked, and tibia II is much longer than metatarsus II (a trifle shorter in *M. montanus*).

◆

feet and the presence of a longer or shorter tail-like process at the end of the last segment. The crotchets of the abdominal feet are peculiar, as they are arranged in a complete circle, such as is found in the Microlepidoptera, except that the crotchets on the outer half of the foot differ from those on the inner half. This seems to show that the structure is a case of secondary adaptation.

The eggs are indistinguishable from Geometrid eggs.

Oreta rosea *Walker.*

This is the most specialized larva. It is curious that the moth should belong to a genus found in India, yet there seems no essential structural difference.

The little larvæ may be found not uncommonly on all the species of viburnum. When newly hatched, the setæ can be made out, arranged in the normal manner of the Noctuina, iv behind the spiracle, vi absent. There are no secondary hairs, though the body is minutely roughened. The setæ are very short with enlarged tips. After the first moult the primary setæ become obscured by secondary ones, and later the larva is much roughened and its surface greatly modified. The larva lives freely exposed.

Platypteryx arcuata *Walker.*

As regards the length of "tail" this larva comes next, though in other characters it is more generalized than the following species. It has been fully described by Dr. Packard, but I believe the organ with which it produces its scratching sound has not been mentioned. The larva curls up the edge of a leaf of birch or alder by drawing threads over it, and covers the exposed upper part with a coarse netting. When disturbed, it contracts its body repeatedly, producing a scratching sound. The sound is caused by the friction on the leaf of two stiff shovel-shaped setæ, situated at the end of the last segment below the tail-like process. The primary setæ are distinct in the last stage, though supplemented by secondary ones.

Falcaria bilineata *Packard.*

This larva lives freely exposed on the leaves or stem of the white birch. The "tail" is short and upturned. The setæ are as in the preceding. I have recently described it.

Eudeilinea herminiata *Guenée.*

These curious little larvæ are common on the bushy species of dogwood (*Cornus stolonifera*, *C. paniculata*). They live singly, spinning two leaves together, within which they remain concealed. The leaves are in no wise folded, but two naturally overlapping ones are united by several short, stout cross-bands of silk. The larvæ feed only on the undermost leaves, and on account of these habits there is no sign of their presence on the bushes, unless one attempts to separate the apparently simply overlapping leaves.

Egg.—Laid two to seven together on the under side of a leaf; elliptical, much flattened above and below, reticulations narrow, regular, somewhat rounded, with short pile at the angles. The surface of the cells between seems smooth. Color pale whitish green, shining. Size .7x .5x .4 mm.

Larva.—Head bilobed, rounded, clypeus large, shining, shagreened; color whitish, jaws and a shade below apex of each lobe in front yellow brown; two transverse bands connected by a strong band on the side of the head behind ocelli; lower band from base of jaw to ocelli, upper above clypeus, but obsolete centrally in the yellow cloud below apex. Body flattened, thoracic feet small, colorless, hairy below; abdominal feet on joints 7–10, normal as to the crotchets on the inside of the planta, but about six occur also on the outside; the inner row is dense, the hooks of different lengths, while those on the outside are single and remote; no anal feet, the fleshy plate produced into a short conic process. Setæ fine, short and very obscure, except at the extremities. Body smooth, translucent whitish with a green shade dorsally especially in the dorsal vessel; tracheal line evident by transparency, white; cervical shield hemispherical, whitish, shining, a gray shade at the lateral corners. Above and before the spiracle on joint 2 is a shining black elliptical spot, bearing two setæ, suggesting a parasitic attack to which this in-except in the absence of the definite secondary setæ of the latter. The difference is mainly one of degree. In *Eudeilinea* the setæ have the normal arrangement for the Noctuina, but there are no secondary hairs anywhere above the base of the leg. The seta associated with iii in *Platypteryx* and *Falcaria* is therefore wanting here.

ON THE LARVÆ OF THE HEPIALIDÆ.

PLATES III AND IV.

By A. S. PACKARD.

Of the form and structure of the larvæ of this family very little is known. A brief notice of the egg of *Hepialus argenteomaculatus*, by P. H. Gosse, appeared in his "Canadian Naturalist" (p. 248, 1840). In 1888 Prof. D. S. Kellicott published in Entomologica Americana (iv. p. 153) notes on the larva, which he obtained in abundance in Central New York, from the roots and stems of *Alnus incana*, and showed that the larva probably requires three years to complete its growth. He received the pupa, which disclosed the moth June 2d. In commenting on his paper, Prof. J. B. Smith stated his belief that it lived in the oak, willow and poplar.

In the following year Prof. Kellicott described the mature larva and the pupa, adding further details as to its habits. The eggs are laid the first week in June; the caterpillars live for two years in the roots, and as the third year advances they work upward more or less into the stems; in the spring of the third year they bore out to the surface, partially or loosely plug the opening with chips and transform; pupation occurs about May 1 (in Oswego County, N. Y.), the moths emerging a month later.. Mr. Kellicott writes me that he did not preserve either the larva or pupa, of which good figures are much needed. The eggs were not described.

In his note on the habits of *Hepialus thule* (Can. Ent. Vol. xxv, Dec. 1893, p. 297), Mr. H. H. Lyman describes its eggs, of which the enormous number of 2,151 were laid, and this seems to be the first account which we have of any eggs of this family, the works of European authors being apparently defective as regards the habits and life-history of the species of this group. The eggs are said to be "even, oval, slightly flattened on the lower side, perfectly smooth, but dull, like unglazed porcelain. Color a pale honey-yellow when laid, soon turning black.

Our common Hepialus, *H. mustelinus*, is not uncommon at Brunswick, Maine, resting on the trunks of spruce trees in July. The trees are thickly placed and ferns grow under them. I suspect that they live in the spruce, rather than in the roots of ferns, but have no reason for this opinion. I captured a female in my stable, situated among the spruces, boxed her, and a day after, on the 26th of July, she was kind enough to lay several hundred eggs which I did not count. They were fortunately fertilized, and the young hatched out from them a week or two later; I did not make a note of the exact date.

Egg.—The eggs are very peculiar in appearance, quite different from those of any other moth. They are small, black, shining like seeds. They are about one-half a millemeter in length, the diameter a little less, as the eggs are cylindrical-spherical, slightly pointed at each end. The shell is jet black, highly polished, and under a half-inch objective shows no traces of ornamentation.

Freshly-hatched larva.—(Pl. III, Fig. 1.) Length 1.3 mm. Head large, broad and flattened, somewhat wider than the body and very pale chitinous. Prothoracic segment as wide as the head and with a large dorsal chitinous plate of the same color as the head. The 2d and 3d thoracic segments have no plates. The body is moderately wide, a little flattened and pale whitish, with no markings, and gradually and slightly tapers toward the end. The spinneret is unusually large and long, and the maxillæ are rather large. The thoracic legs are testaceous (chitinous), of the same hue as the head. The abdominal legs are rather long, pale. The hairs are arranged as in Pl. III, Fig. 1 to (A, part of the head, and the succeeding four segments; and B, In the absence of any figure of a native form, I insert camera drawings of two common European species* to show that while they do not differ much in shape, they vary much in the size of the flattened tubercles or chitinous plates from which the setæ arise.

Pl. IV, Fig. 1, represents a dorsal view of the European *Hepialus humuli.*

Pl. IV, Fig. 2, A side view of the same specimen. It will be seen that the prothoracic plate is rather large, while the setiferous tubercles on the second thoracic segment are of the same size as those of the abdominal segments, but those of the second row on the third thoracic segment are about twice as large. This seems a simpler form than the next species figured, as the flattened tubercles give rise to but a single hair.

In the second species, *Hepialus hectus* (Pl. IV, Figs. 3 and 4), there is a considerable amount of divergence from the simple, primitive form of *H. humuli.* On the second and third thoracic plate there is a medium dorsal plate bearing four setæ, and behind on each side a large sub-dorsal plate bearing three short setæ. On the abdominal segments 1–8 are four dorsal setæ and three lateral setæ, arranged as represented in the figure, one being situated above the small spiracle and two behind. The segments are subdivided into four wrinkles, more or less indistinct in the blown specimens which are stretched out abnormally.

Pl. III, Fig. 4. I also add a figure of the front of the head of the pupa of *Hepialus humuli*, which with that of *Œnetus virescens* from New Zealand, I owe to the kindness of Dr. T. Algernon Chapman. The structure of the head is very peculiar. On the vertex are prominent callosities, giving strength to the head in breaking out of the cell. The eye is large, divided by a distinct line, the outer side of the eye more or less corrugated. Directly under the eye are the large triangular maxillary palpi (*mx p*). The maxillæ themselves are short, but not shown in the figure. The clypeal region is narrow, with tubercles and rugosities; the labrum is scarcely differentiated from the front edge of the clypeus, but is slightly bilobate on the base. On each side are what I call the paraclypeal pieces or sclerites (*p*), of the homology of which I am not sure, unless they are identical with the tubercles seen in most Lepidoptera on each side of the labrum, and formerly regarded as the mandibles. It is present, though small and reduced in *Hepialus*. The labial palpi (*mx' p*) are large and wide, and divided at the end.

---

* For blown specimens of these and other lepidopterous larvæ, as well as pupæ and cocoons, I am indebted to the generosity of my friend, Dr. Otto Staudinger, of Blasewitz, Dresden, Germany, who kindly selected them from his immense collection of blown larvæ and other Lepidoptera.

Pl. III, Fig. 3, represents the head of *Œnetus virescens* Doubleday. The paraclypeal pieces are not differentiated; while the labrum appears to be slightly distinct from the clypeus, and excavated in the middle of the front edge, the labial palpi (*mx' p*) are very short; the maxillary palpi are as in *Hepialus*.

The under side of the end of the body of this pupa, including abdominal segments 8 to 10, is represented by Pl. III, Fig. 2; on the eighth segment is the well developed toothed ridge, while each side of the segment is irregularly dentate. On the ninth segment (IX) are the rudiments of the male genital opening of the moth, a longitudinal scar situated between the usual two tubercles, while the vestiges of the anal legs of the larva (*a. l.*) are represented by the longitudinal flattened tubercles enclosing the scar or vestige of the anus.

Dr. Chapman (Trans. Ent. Soc. London, March, 1893), has from the pupal characters shown that the Hepialidæ should be associated with the Tineina in his division of *Pupæ incompletæ*; shortly after, in the same year, Prof. Comstock (Evolution and Taxonomy) concluded from a study of the venation that the group should be placed at the very bottom of the Lepidopterous series, and Mr. Dyar (Ann. N. Y. Acad. Sc. VIII, 1894, p. 197) agreed with Comstock's view from the examination of a sketch of an European larva (*H. lupulinus*). From a somewhat extended study of the larval, pupal, and also the imaginal characters (thorax and head), including the pupa of *Phassus*, I think there is little doubt but that the Hepialidæ are colossal Tineoids, with the essential features of Tinea and its allies, but yet some-

Fig. 4. Hepialus humuli.—Head of pupa; *mxp*, maxillary palpi; *mx'.p*, labial palpi; *p*, paraclypeal piece.

PLATE IV.

Fig. 1. Hepialus humuli.—Side view of larva.
Fig. 2. Hepialus humuli.—Dorsal view of larva.
Fig. 3. Hepialus hectus.—Side view of larva.
Fig. 4. Hepialus hectus.—Dorsal view of larva.

◆

PRELIMINARY HAND-BOOK OF THE COLEOPTERA OF NORTH EASTERN AMERICA.

BY CHARLES W. LENG AND WM. BEUTENMULLER.

(Continued from Vol. II, p. 190.)

HARPALINÆ.

The members of this sub-family have the middle coxal cavities entirely closed by the central pieces of the meso and metasternum, the epimera not attaining the coxa. Head with setigerous puncture over the eyes. Thorax with setigerous puncture at the side and posterior angle, very rarely without the latter and still more rarely without either. Anterior tibiæ always either obliquely sinuate or deeply emarginate within, the inner spur remote from the apex. They may be divided into two sections, Harpalinæ bisetosæ, head with two-supra-orbital setigerous punctures, and Harpalinæ unisetosæ, which have the head with one supra-orbital setigerous puncture. The former contain all the genera from *Panagæus* to *Helluomorpha* inclusive, and the latter from *Brachynus* to *Anisodactylus* inclusive.

Panagæus *Lat.*

Head more or less constricted behind the eyes and dilated to a semi-globular neck; clypeus prolonged beyond the base of mandibles, which are scissor-like; antennæ arising from under a distinct frontal ridge, three basal joints glabrous; terminal joint of maxillary palpi arising obliquely from the preceding joint; sides of elytra narrowly inflexed; thorax globular, abruptly constricted behind. Found under stones during May and June.

Synopsis of Species.

Elytra black with two large red spots extending from the margin to the first or second striæ,..**crucigerus**
Elytra red with a transverse black band behind the middle and another at the tip, ...**fasciatus**

P. crucigerus *Say.*—Hirsute; head and thorax black; elytra with four large red spots; thorax with numerous deeply punctatures, globular, abruptly constricted behind, angles acute; elytral striæ and punctures deep. Length .45 inch = 11 mm.

Habitat: N. Y., N. J. and southward.

P. fasciatus *Say.*—Pl. V, Fig. 1—Hirsute; head and thorax ferrugineous, the latter deeply punctured and abruptly constricted behind; elytra red with a transverse black band behind the middle and at the tip, striæ and punctured deep and distinct. Length .32 inch = 8 mm.

Habitat: N. Y., N. J. and southward.

Nomius *Lap.*

Antennæ somewhat moniliform, arising from a distinct frontal ridge; head stout, oval, neck broad; eyes prominent: labrum short, broadly emarginate; mandibles arcuate, with a feeble tooth on the inner edge at middle, and a setigerous puncture outside; body pedunculate, scutellum not visible between the elytra; elytra slightly margined at base near the hind angles; tarsi not dilated.

Occur under stones in moist places.

N. pygmæus—*Dej.* Piceous elytra elongate, sides parallel, striated, punctured; legs rufous, thorax broader in front than behind. Convex, slightly rounded anteriorly at sides; anterior angles obtusely rounded, hind angles straight. Length .28 inch = 7 mm.

Habitat: N. J., Can., Lake Sup., southward and westward to California, also Europe.

Patrobus *Dej.*

Medium size: Head more or less constricted behind the eyes or

P. longicornis *Say.*—Pl. V., Fig. 2.—Black above, piceus beneath; antennæ rufous; feet testaceous; mouth parts rufous; thorax somewhat broader than long, convex, sinuate behind, angles rectangular, dorsal line deep, basal impression rounded and punctured; elytra with sides sub-parallel, striæ deep and distinctly punctured, intervals convex on the disc, flattened at the sides; antennæ half as long as the body. Length .52 inch = 13 mm.

Habitat: Northeast America.

P. septentrionis *Dej.*—Shining black; thorax subcordate, rounded anteriorly, sub-sinuate behind, hind angles rectangnlar, subcarinate, dorsal line distinctly impressed; elytra, elongate-ovate, striæ with punctures, third interval with three deep punctures; antennæ rufo-piceous; legs ferrugineous. Length .40 inch = 10 mm.

Habitat: New Hampshire to Labrador, westward to Alaska; also Siberia and Europe.

P. rugicollis *Rand.*—Black, body elongate, femora and tibiæ black; knees and tarsi piceus; head with a few transverse wrinkles; thorax transversely rugose, much flattened, especially at the sides, median line profound; basal region punctured, with the posterior impressions very rugose; elytra much depressed, striæ punctured, intervals flattened. Length .45 = 11.25 mm.

Habitat: New York, Pennsylvania, Massachusetts and northward.

Pogonus *Dej.*

Size small: Head not constricted behind the eyes; elytra margined at the base; mentum tooth deeply notched; ligula with a single bristle at the top; epilobes of mentum acutely toothed.

The general appearance of this genus is that of *Bradycellus.*

P. texanus *Chd.*—Body short, robust, convex, and of metallic blackish green color; hind angles of thorax rectangular and the base each side with two feeble foveæ; elytral striæ faint, only the inner ones being distinct, and distinctly punctured in front and only finely so behind, the marginal and sub-marginal striæ are confluent in front, the latter is almost obsolete, except towards tip, where it is deep; body beneath, blackish brown; legs testaceous. Length, .28–.32 inch= 7–8 mm.

Habitat: N. J. (Atlantic City), Texas.

Trechus *Clair.*

Size small: Elytra almost twice as wide as long or oblong oval;

anterior tibiæ slightly broader to tip, the emargination extending nearly to the middle of the tibiæ; terminal joint of palpi slender, acute at tip, that of the labial palpi shorter than the preceding.

Synopsis of Species.

Elytra oblong, nearly twice as broad as long, with five or six impressed striæ, **rubens.**

Elytra oblong oval, humeri distinct, with four or five striæ, the outer two very feebly impressed . . . . **chalybæus.**

T. **rubens** *Fabr.*—Rufo-piceus; thorax subquadrate, at each side of base foveolate; hind angles obtuse; elytra oblong oval, with four distinct dorsal striæ, the outer ones obsolete; antennæ and legs rufo-testaceous. Length .20 inch = 5 mm.

Habitat: Nova Scotia, also Europe.

T. **chalybæus** *Dej.*—Apterous, jet black, with a bluish gloss; thorax, subquadrate, foveolate at each side behind, posterior angles nearly straight; elytra oval, with four or five dorsal striæ, the outer two very feeble; antennæ and legs rufous. Length, .20 inch = 5 mm.

Habitat: New Hampshire, Lake Superior, westward to Alaska.

(*To be continued.*)

◆

LOCAL ENTOMOLOGICAL NOTES.

Members of the New York Entomological Society and all others are solicited to contribute to this column their notes on rare captures, local lists and other items of interest relating to the insect fauna of New York City and vicinity.

◆

present a good showing. Long Island represents the northern limit of quite a number of southern spiders; such as *Mahadeva verrucosa*, *Epeira scutulata*, *Theridium glaucescens*, *Oxyptila monroensis*, *Gnaphosa sericata*, *Aulonia funerea*, *Oxyopes scalaris*, *Hyctia pikei* and *Zygoballus sexpunctatus*. Several other forms extend a little ways into New England, as the genus *Acrosoma*, *Vixia infumata*, *Epeira foliata*, *Theridula sphærula*, *Argyrodes cancellatus*, *Romphæa fictilium* and *Lathrodectes mactans*. It is, as far as known, the southern limit of a few sub-boreal forms which extend across the northern part of the country; for example, *Ergane borealis*, *Agrœca ornata* and *Drassus robustus*. Being an island, it lacks some forms (perhaps not yet discovered) which inhabit the mainland. This is most strikingly shown by the fact that I have observed but two specimens of *Epeira displicata*, a species widely spread and common on the mainland.

SCYTODIDÆ.

Scytodes thoracica *Latr.*—Not uncommon in houses.

PHOLCIDÆ.

Pholcus phalangoides *Fuessl.*—Recorded, I believe, from Brooklyn.

Spermophora meridionalis *Hentz.*—A few specimens under furniture in the house.

OONOPIDÆ.

Orchestina saltitans *Banks.*—One specimen in the house. July.

DYSDERIDÆ.

Ariadne bicolor Hentz.—Not uncommon under bark and sweeping herbage.

DRASSIDÆ.

Micaria agilis *Banks.*—Running on the sand near sea-shore. July.

Micaria montana *Em.*—One male, on the ground in a field.

Drassus robustus *Em.*—One specimen under a stone. September.

Prosthesima atra *Hentz.*—Common, under stones, dead leaves, etc.

Prosthesima ecclesiastica *Hentz.*—Quite common, hibernates under loose bark.

Prosthesima depressa *Em.*—A few specimens, under dead leaves.

Prosthesima frigida *Banks.*—Two specimens in an old cemetery. September.

Prosthesima rufula *Banks.*—A few specimens in an old field. October.

Prosthesima insularis, sp. nov.

Length ♀ 8.5 mm.; ceph. 2.8 mm. long, 2.1 mm. wide; patella plus tibia IV, 2.8 mm. Cephalothorax, mandibles, legs, palpi and sternum dark red brown, the latter darker on edges; the legs paler on the tarsi; abdomen gray above and below, with black hairs; spinnerets yellow. Posterior row of eyes straight, barely longer than the anterior row, P. M. E. oval, more than their diameter apart, and about as near to P. S. E. as to each other; A. M. E. larger, about half their diameter apart and less than this distance from the smaller A. S. E. Legs short and stout, the scopulas are very thin, no spines under tibia I, one above on tibiæ III and IV; sternum broad; the epigynum consists of a very long cavity nearly filled by a corneous projection, more than twice as long as wide.

One female, Sea Cliff, Long Island, N. Y.

This is about half way between *Drassus* and *Prosthesima* but the posterior row of eyes being straight, and but little longer than the anterior row, gives it more affinity with *Prosthesima.*

Prosthesima nova, sp. nov.

Length ♂ 6 mm. Cephalothorax yellow brown, blackish on the margin; legs pale, sometimes with a faint tinge of greenish; sternum yellowish; abdomen dull black with a basal reddish shield. Cephalothorax quite broad, head narrow; eye-rows short, posterior a little procurved, not longer than anterior one, the P. M. E. large, oval, not half their diameter apart, not quite their diameter from the slightly smaller S. E. Legs moderate, stout, especially the femora and tibiæ of the anterior pair; no spine above on tibia IV, none below on tibia I, femur I with two spines above; abdomen depressed, about as long and no broader than the cephalothorax; some stiff black hairs, and a triangular horny shield at base; sternum quite long and

Cesonia bilineata *Hentz.*—Under dead leaves, not uncommon. September.

CLUBIONIDÆ.

Clubiona pallens *Hentz.*—Quite common, under bark, among dead leaves. October, December.

Clubiona riparia *Koch.* (*C. ornata* EM., Preoccupied. *C. Americana* BANKS.)—Not common, under bark. December.

Clubiona minuta *Em.* (*C. pygmæa* BANKS.)—A few specimens, swept from bushes. July.

Clubiona abbotti *Koch.*—Common, hiding in leaves or crevices of bark. July, August.

Clubiona tibialis *Em.*—Recorded by Emerton from Long Island.

Clubiona littoralis, sp. nov.

Length 6–9 mm. Cephalothorax red brown gradually growing paler behind; mandibles, maxillæ and lip dark red brown; legs pale yellowish; sternum yellowish, darker in front; abdomen yellowish; frequently blackened near the tip, sometimes indications of a basal spear-mark, abdomen and legs black haired. Cephalothorax very broad in front, a little more than once and a half as long as broad, eye-rows fully two-thirds as broad as head, the posterior broader than the anterior and pro curved; the P. M. E. further from each other than from the P. S. E.; the anterior row almost on the margin, the A. M. E. larger than the other eyes and less than their diameter apart. The mandibles are large, very convex above and projecting forward, the ridge at base on outside quite short; sternum narrow, bluntly pointed behind; legs moderate, slender, fourth pair much the longest, at least two spines beneath on all the tibiæ; abdomen about twice as long as broad, in the ♂ not much longer than the cephalothorax. The epigynum projects behind in an emarginate lobe, the surface above is transversely striate and shows beneath on each side two oval bodies, one reddish and one nearly black. The male palpi are small, the patella is as long as the tibia and has a distinct tooth at its apex on the inner side; the tibia has a broad, curved, plate-like projection which is notched on the outside, it does not extend over the tarsus, and is truncate at tip and with a rounded tooth toward the inner side; the tarsus is about twice as long as wide, seen from the side there is near the tip a prominent projection with two teeth on the upper side, the tube is stout and curved around the tip of the palpal organ.

Many specimens from salt-marshes near Sea Cliff, N. Y. June.

Koch has described a *Clubiona maritima* from St. Thomas, but it has no special relation to this species.

Clubiona crassipalpis *Keys*—Rare, under damp leaves near Sea Cliff, and in Black Swamp, Roslyn. December.

Clubiona pusilla *Em.*—One specimen, probably this species. October.

Anyphæna gracilis *Hentz.* (*A. rubra* EM.)—Not common. October. Hibernates under loose bark.

Gayenna fraterna *Banks.*—One male, Harbor Hill, Roslyn, swept from grass. May.

Gayenna celer *Hentz.* (*Anyphæna incerta* KEYS.)—Common in fields, and under leaves. September, October.

Gayenna calcarata *Em.*—Only one male.

Gayenna saltabunda *Hentz.*—Not common, in old fields. September.

Thargalia descriptus *Hentz*—A few specimens. July.

Thargalia longipalpis *Hentz.*—Under dead leaves in dry places. August.

Thargalia trilineata *Hentz.*—In sandy places, under dead leaves. July, August.

Thargalia bivittata *Keys.*—One young specimen, under leaves in woods. May.

Agrœca pratensis *Em.*—Common in fields, under leaves in woods, etc. September, October.

Agrœca ornata *Banks.* (*A. repens* EM.)—One female, under leaves. May.

Agrœca minuta, sp. nov.

Length ♀ 3.8 mm. Cephalothorax pale yellowish, sides above with blackish markings almost forming a stripe, marginal seam distinctly black, mandibles slightly greenish, sternum yellowish, anterior femora, patellæ and tibiæ greenish, rest paler, posterior femora greenish, tibiæ and metatarsi with not very distinct brown bands at bases and tips. Abdomen pale, with a large brown herring bone mark above, sides

Phrurolithus alarius *Hentz.*—Under dead leaves in woods, under stones, etc. Common.

Phrurolithus similis, sp. nov.

Length 2 mm. The cephalothorax is brown, with a black spot behind eye-region sending three fine lines forward and several to the sides; the palpi are dark brown the legs pale yellow, each femur with a black stripe on the anterior and one on the posterior side; on the anterior femur they almost cover the joint; a black line under the posterior tibiæ and metatarsi; the sternum light brown, broad, triangular; the venter pale brown at base, whitish in middle and black toward spinnerets, black above, shining, sometimes a pair of indistinct pale spots at extreme base. The male palpi are short, the femur with a prominent projection near base tipped with stiff hairs; the tibial hook is very broad at base, with a long curved outer projection and an inner very short truncate one; the bulb has a very stout tube.

In old fields; September and October. This species has much resemblance to *P. pugnatus*, but is much darker, the legs lined with black, the inner projection of the tibial hook very short (long in *P. pugnatus*), while the outer one is more curved than in that species.

Phrurolithus formica, sp. nov.

Lenghth 2.1 mm. Cephalothorax red brown, with a black spot behind head; legs dark yellow brown, the femora sometimes showing traces of a darker stripe; sternum yellowish, margined with black; venter brown at base, pale in middle, black at lip; shining black above. The male palpi short; the projection of the femur is a the middle of joint (not nearer base), with some stiff black hairs projecting toward the apex of femur; tibial hook very much swollen on inner side and crenate, the outer projection stout comparatively short and very taper pointed; the tube of bulb very slender.

Heavier than the preceding species, and the palpus twice as large, without an inner projection to tibial hook. Quite common in the nests of some black ants. December.

Trachelas tranguilla *Hentz.*—Very common. August, September, October.

Meriola, gen. nov.

Related to *Trachelas*, but the posterior row of eyes is barely recurved, and scarcely longer than the anterior row. The cephalothorax is not quite as much narrowed in front as in *Trachelas*. The mandibles are large and stout, with two teeth below on posterior margin. The legs are like *Trachelas* and without spines, but scantily clothed on the underside of metatarsus and tarsus with serrated hairs. The cephalothorax is shining like *Trachelas*.

Meriola decepta, sp. nov.

Length 4 mm. Cephalothorax, mandibles and sternum dark red brown, like *Trachelas tranquilla*; legs pale yellowish, anterior pairs reddish toward base. Abdomen pale, black on sides; a narrow median black stripe above, connected behind to the side-stripes; two blackish stripes on venter. Cephalothorax about as long as tibia plus patella I, as broad as length of tibia I, but little narrowed in front. Eyes about equal, posterior row barely recurved and hardly longer than anterior row, the M. E. a little closer to each other than to the S. E., and scarcely more separated than are the A. M. E. The mandibles are stout and slightly porrect. Sternum nearly oval, as in *Trachelas*. Legs without spines, many simple hairs, and serrate ones under tarsi and metatarsi. Abdomen elliptical, spinnerets short. The epigynum has a dark spot on each side, and in the lower corner of each a still darker dot connected to the posterior margin by a dark line; two oval cavities are indicated in front.

Five females from Sea Cliff; in an old meadow, on ground. October, September. The young have a pale cephalothorax, like the young of *Trachelas*. It has much resemblance, at first sight, to *Grammonota pictilis* Cb.

AGALENIDÆ.

Agalena nævia *Hentz.*—Abundant everywhere.

Tegenaria derhami *Scop.*—Common around buildings.

Cœlotes medicinalis *Em.*—Two specimens, one under stone, near beach, with a round cocoon covered with grains of sand. July.

Cœlotes nigriceps, sp. nov.

Length 9.5 mm.; ceph. 4 mm. long, 2.4 mm. wide, leg I 10 mm., leg IV 12 mm. Cephalothorax pale yellow brown, blackened on head, three black marks each side in the furrows; mandibles black; legs yellow brown, darker on tibiæ and metatarsi; sternum yellow brown; abdomen dark gray, thickly spotted with black in the usual pattern. Head quite broad; A. M. E. much smaller than A. S. E., the other eyes subequal; mandibles very large, strongly geniculate at base; legs short, black haired, spined as in *C. longitarsis*; sternum broad, barely narrowed in front, pointed behind, distinctly broader than in *C. longitarsis*; epigynum large, semicircular, tranversed by a narrow septum.

Amaurobius ferox *Koch.*—In woodpile, not common. September.

Titanœca americana *Em.*—One specimen, under a board at Bayville. August.

Dictyna sublata *Hentz.* (*D. muraria* EM.)—Common, sweeping grass and weeds. Summer.

Dictyna volucripes *Keys.*—A few specimens, sweeping grass. Summer.

Dictyna foliacea *Hentz.* (*D. volupis* KEYS.)—Common in grass, bushes and on trees. Summer.

Dictyna frondea *Em.* (*D. vittata* KEYS. Preoccupied.)—Several specimens, sweeping grass. August.

Dictyna minuta *Em.*—One male, sweeping an old field. September.

Neophanes pallidus *Marx.*—A few specimens on ground, under dead leaves. July.

ULOBORIDÆ.

Uloborus plumipes *Luc.*—Not uncommon, webs in fences, dead branches, etc. August.

Hyptiotes cavaticus *Hentz.*—Not very common, dead branches, shrubs, etc. September, October.

MIMETIDÆ.

Mimetus interfector *Hentz.*—Not rare, on bushes and trees. August.

Ero thoracia *Reuss.*—Two specimens in an old field, on ground. September.

THERIDIDÆ.

Argyrodes trigonum *Hentz.*—Quite common, usually in web of some other spider. July.

Argyrodes cancellatus *Hentz.*—But one specimen.

Romphæa fictilum *Hentz.*—Not uncommon, in old fields, on grass. September, October.

Theridium tepidariorum *Koch.*—Abundant, everywhere, most common in houses.

Theridium kentuckyense *Keys.*—Not uncommon, in cedars and on fences. July.

Theridium murarium *Em.*—Not common, in cedars.

Theridium spirale *Em.*—A few specimens from trees, mostly cedars. September.

Theridium differens *Em.*—Quite common, weeds and shrubs.

Theridium glaucescens *Becker.*—Three specimens, sweeping. July.

Theridium frondeum *Hentz.*—Very common, on weeds, etc. July, August.

Theridium albidum, sp. nov.

Length 2.2 mm. The cephalothorax is pale yellowish, with a single median line which does not reach the eye region, this is indistinct in the ♀; the ♂ abdomen is gray with four black spots above and a median white stripe; the ♀ abdomen is white above and gray below without black spots; the legs are white or pale yellow, in one ♂ slightly darker at ends of femora and tibiæ. There is a little projection at the base of the mandibles as in *T. frondeum*; the abdomen is not as spherical as in that species. The ♂ palpus is about one-half the size of that of *T. frondeum*, the bifid hook is proportionately much larger and more prominent, the tube that lies in the hyaline sheath is much shorter and stouter than in *T. frondeum.*

Sea Cliff, N. Y., a few specimens. Shreveport, La.

Theridium unimaculatum *Em.*—Common, often near evergreens. September, October.

Lathrodectes mactans *Koch.*—One specimen from Woodhaven, L. I., collected by R. L. Ditmars.

Steatoda borealis *Hentz.*—Common, usually in houses.

Enoplognatha marmorata *Hentz.*—One specimen.

Lithyphantes corollatus *Linn.*—Two males, under stones; one Glen Cove, October; the other Bayville. January.

Asagena americana *Em.*—Not common, running on dry ground. May, June.

Dipœna nigra *Em.*—A few specimens, sweeping.

Theridula sphærula *Hentz.*—Not common, sweeping. August.

Microdipœna guttata, sp. nov.

Length .8 to 1 mm. Cephalothorax pale yellowish, with a blackish spot in middle and a black margin; sternum pale, dark on margin; legs pale, ringed with blackish; abdomen dark gray, paler above spinnerets, with about twelve small silvery spots above, sides indistinctly mottled, a short silvery stripe on lower side just above spinnerets, on venter two transverse black bands between spinnerets and base of abdomen. Cephalothorax short and broad, in the ♂ greatly elevated at head, the clypeus very concave; mandibles small; legs of moderate length and not very slender, first pair longest, femur I about as long as cephalothorax. The abdomen is globose, smooth, the spinnerets quite prominent. The ♂ palpus is large, the tarsus very small, barely noticed, the bulb large, ovoid, and pale-colored; a dark ring around the middle, and a short curved black tube at tip.

Six specimens of this tiny little spider were found in June and October. Under dead leaves in a dry woods.

Ulesanis americana *Em.*—Two specimens, sweeping in an old field. October.

Ancylorrhanis hirsuta *Em.*—Two specimens, under dead cedar branch on ground. October.

Idionella formosa *Banks.*—One specimen in moss.

Ceratinella emertoni *Cambr.*—Common, sweeping in fields. August.

Ceratinella fissiceps *Cambr.*—Common, sweeping. August, September.

Ceratinella similis *Banks.*—Quite common, sweeping. September.

Ceratinella melanocnemis *Fox.*—Several specimens, sweeping.

Ceratinella pygmæa *Em.*—A few specimens. under dead leaves in woods.

Ceratinella lætabilis *Cambr.*—Two specimens, on ground in woods.

Ceratinella brunnea *Em.*—Two specimens, under dead leaves. May, March.

Ceratinella micropalpis *Em.*—A few specimens, sweeping weeds.

Ceratinella? annulipes *Bks.*—One specimen, under bark. March.

Ceratinopsis nigripalpis *Em.*—Not uncommon, in cedar trees. September, October.

Ceratinopsis laticeps *Em.* (*Erigone zanthippe* KEYS.)—I have two females from Sea Cliff, which are Keyserling's species; Emerton's male is, I believe, this species.

Cornicularia brevicornis *Em.*—Several specimens which I consider this species.

Cornicularia minuta *Em.*—One male, undoubtedly this species, in moss. July.

Cornicularia indirecta *Cambr.*—One female, probably this species.

Cornicularia communis *Em.*—One female, under leaves.

Spiropalpus spiralis *Em*—Not common, under leaves in woods. May, June.

Grammonota ornata *Cambr.*—Under or near evergreens. September, October.

Grammonota inornata *Em.*—Three specimens, under leaves in woods. May, June.

Grammonota trivittata, sp. nov.

Length 2.8 mm. Cephalothorax pale yellowish brown, sides darker yellow brown, eyes with black rings; mandibles reddish; sternum reddish, darker on the margins; legs pale yellowish; abdomen pale gray, with a narrow black central stripe, and a much broader one on each side, these stripes are not connected except at extreme tip, venter blackish each side of a pale elongated central area. Cephalothorax low, but little elevated behind the eye-region, quite broad in front and longer than tibia plus patella I; eyes about as usual, the A. M. E. smaller than the others and close together, the P. M. E. nearer to each other than to the P. S. E.; sternum truncate in front, tapering behind, a little narrower than in *G. pictilis*; legs moderate, anterior pair about as long as body, all with many stiff bristles; abdomen broadest a little beyond the middle, pointed at tip. Epigynum has a notch on the posterior margin, disclosing a somewhat triangular projection, each side is an oblong dark body, the notch is narrower than in *G. pictilis.*

Many females from salt marshes near Sea Cliff, N. Y., November, December. This species has some resemblance to *G.. pictilis*, but the stripes are not connected and the cephalothorax is more yellow.

Lophocarenum crenatum *Em.*—Quite common on ground. July, August.

Lophocarenum rostratum *Em.*—Under leaves in a dry woods. December.

Lophocarenum florens *Cambr.*—Under rubbish in swamp at Mill Neck. April.

Tmeticus trilobatus *Em.*—Three specimens, probably this species.

Tmeticus terrestris *Em.*—Several specimens, Black Swamp. October.

Tmeticus probatus *Em.*—Not common, under dead leaves. October, November.

Tmeticus concavus *Em.*—Quite common, Black Swamp. October.

Erigone persimilis *Cambr.*—One male.

Erigone dentigera *Cambr.*—Not common, Black Swamp. June.

Erigone autumnalis *Em.*—Quite common, under leaves. October, November.

Linyphia marginata *Koch.*—Not common. September.

Linyphia phrygiana *Koch.*—Only a few specimens, in woods. October, April.

Linyphia conferta *Hentz.*—Very common, under dead leaves. October.

Linyphia mandibulata *Em.*—One male.

Floronia clathrata *Koch.*—In old fields, under dead leaves. October, November, December.

Tapinopa bilineata *Banks.*—Not common, under dead leaves. July.

Stemonyphantes bucculentus *Linn.*—Common in old fields. October, November.

Drapetisca socialis *Blk.*—On the bark of trees. October.

Lepthyphantes minuta *Blk.*—In piles of cut wood. August.

Diplostyla concolor *Reuss.*—Very common, on ground under leaves. August, September, October.

Diplostyla nigrina *Westr.*—One specimen, Black Swamp. October.

Bathyphantes nebulosus *Blk.*—In houses, quite common. September, November.

Bathyphantes zygia *Keys.*—Often under stones. October.

Bathyphantes formica *Em.*—Common on the ground. July, August.

Bathyphantes micaria *Em.*—A few specimens swept from evergreen shrubbery. July.

Bathyphantes zebra *Em.*—Not very common, under leaves in woods. September.

Bathyphantes decorata *Bks.*—Several specimens under dead leaves.

Bathyphantes unimaculata *Bks.*—Under dead leaves. September, October.

Bathyphantes angulata *Em.*—Several specimens. July.

Microneta cornupalpis *Em.*—In Black Swamp. October, under leaves.

Microneta longibulbus *Em.*—One male, probably this species.

EPEIRIDÆ.

Acrosoma rugosa *Hentz.*—Quite common in woods. August, September.

Acrosoma spinea *Hentz.*—Common on shrubbery. July, August

Acrosoma mitrata *Hentz.*—Moderately common in woods. August, September.

Mahadeva verrucosa *Hentz.*—Not uncommon in woods, webs quite high up. August.

Ordgarius bisaccatus *Em.*—An adult male only 1.8 mm. long, on a post. September.

Plectana stellata *Hentz.*—Not very common, sweeping fields.

Epeira prompta *Hentz.* (*E. parvula* KEYS.)—Common, sweeping meadows, evergreen trees, etc.

Epeira foliata *Heutz.*—Not common, on trees. September.

Epeira displicata *Hentz.*—Rare, only two specimens on oak. October.

Epeira juniperi *Em.*—A few specimens from evergreens.

Epeira gibberosa *Hentz.*—Common in herbage.

Epeira maculata *Keys.*—Rare, sweeping.

Epeira placida *Hentz.*—Not uncommon in old fields.

Vixia infumata *Hentz.*—A few young specimens, sweeping.

Singa variabilis *Em.*—Two specimens swept from old field. October.

Singa maculata *Em.*—A few specimens swept from meadow.

Theridiosoma gemmosa *Koch.*—Swept from low herbage, in woods. June.

Cyclosa conica *Pallas.*—Common. September, October.

Argiope riparia *Hentz.*—Not very common. August, September.

Argiope transversa *Em.*—More common than the preceding. August, September.

Argyroepeira hortorum *Hentz.*—Common. in herbage. July, August.

Tetragnatha grallator *Hentz.*—Quite common, usually near water. July.

Tetragnatha laboriosa *Hentz.*—Abundant, sweeping. Summer

Eugnatha vermiformis *Em.*—A few specimens in woods. July.

Pachygnatha brevis *Keys.*—One specimen, under leaves. October.

Pachygnatha autumnalis *Em.*—Not uncommon, under leaves.

Pachygnatha tristriata *Keys.*—Recorded by Keyserling from Long Island.

THOMISIDÆ.

Xysticus gulosus *Keys.*—Common; hibernates in adult state.

Xysticus stomachosus *Keys.*—Moderately common, sweeping.

Xysticus triguttatus *Keys.*—Common in meadows. There is a variety of the male which is larger than usual, and marked like the female.

Xysticus gramineus *Em.*—A few specimens, under leaves.

Xysticus nervosus *Bks.*—Quite common in fields. August, September.

Xysticus 4-lineatus *Keys.*—One specimen in an old field. December.

Xysticus fraternus, sp. nov.

Length ♂ 4 mm. Cephalothorax pale brownish, thickly mottled on sides with dark brown; anterior femora and patellæ almost wholly covered with brown spots, tibiæ and metatarsi also sometimes mottled; posterior legs with brown rings at ends of femora and tibiæ and some scattered brown spots; sternum and coxæ mottled with brown; abdomen quite thickly mottled with brown and white, several more prominent spots behind. Cephalothorax quite broad, narrowed in front, depressed; three rows of prominent spines, one median and one on each side of the pale central area; M. E. equal; legs short and stout, anterior femora shorter than cephalothorax, metatarsus I no longer than tibia I, four pairs of spines under tibia I, three pairs under metatarsus I. The male palpus has the tube start at base and go around the bulb to the projection on the other side, but it does not make a bend at tip; on the outer side of the bulb (instead of on middle as in most species) there are two hoods lying in the same plane and curved toward each other; on the opposite or inner side, near the base, there arises a long plate like piece projecting straight across the bulb toward the top of the palpus, it is enlarged and emarginate at tip (no such structure have I seen in any other species); across the basal portion of the bulb there extends obliquely a slender brown piece. The tibia has two projections as in *X. stomachosus*.

One male and several young, under dead leaves. May.

Oxyptila monroensis *Keys.*—Under leaves near seashore, several females and one male only 1.9 mm. long.

Oxyptila conspurcata *Thor.*—One specimen under leaves in Black Swamp. October.

Coriarachne versicolor *Keys.*—A few specimens under bark. November, March.

Philodromus vulgaris Hentz.—Common in houses, under bark, etc. October, December.

Philodromus placidus *Bks.*—Not uncommon on cedar and other trees. July.

Ebo latithorax *Keys.*—In old fields and near seashore. October, September.

LYCOSIDÆ.

Lycosa babingtoni *Blk.*—One specimen.

Lycosa frondicola *Em.*—Among leaves in woods. Spring.

Lycosa arenicola *Scudd.*—Bayville, making nests in the sand. August, September.

Lycosa pratensis *Em.*—Common in fields. Summer.

Lycosa erratica *Hentz.*—Common, often under stones. September.

Lycosa scutulata *Hentz.*—Not common in fields. September.

Lycosa punctulata *Hentz.*—Not so common as preceding. October.

Lycosa rufiventris *Bks.*—Two specimens under dead underbrush; Bayville. December.

Pardosa minima *Meys.*—Quite common on ground.

Pardosa flavipes *Keys.*—Not uncommon in old fields, under leaves, etc.

Pardosa bilineata *Em,*—A few specimens in grass, Harbor Hill. July.

Aulonia aurantica *Em.*—Under dead leaves in damp woods. October, December.

Aulonia? funerea *Hentz.*—A few specimens under leaves.

Pirata insularis *Em.*—Uncommon, in fields.

Pirata piratica *Clerk.*—Under leaves in swamps.

Pirata exigua *Bks.*—Not common, under leaves.

Trochosa cinerea *Fabr.*—Common on seashore. July.

Trochosa rubicunda *Keys.*—One male. October, in an old field.

Pisaura undata *Hentz.*—Quite common, on large herbs.

Dolomedes tenebrosus *Hentz.*—A few young specimens.

Dolomedes urinator *Hentz.*—One male, on log near a stream. April.

OXYOPIDÆ.

Oxyopes scalaris *Hentz.*—Several specimens from an old field. October.

ATTIDÆ.

Phidippus audax *Hentz.*—Abundant, sweeping.

Phidippus rufus *Hentz.*—Quite common, sweeping.

Dendryphantes militaris *Hentz.*—Abundant.

Dendryphantes octavus *Hentz.*—Abundant, sweeping. Summer.

Dendryphantes ornatus *Bks.*—Occasional, sweeping. September.

Attus sylvestris *Em.*—A few specimens near seashore.

Icius palmarum *Hentz.*—Not very common, a small form. July.

Icius mitratus *Hentz.*—Quite common in evergreens. July.

Icius elegans *Hentz.*—Not rare in fields. August.

Icius formicarius *Em.*—Two specimens, on a fence. July.

Icius lineatus *Koch.*—A few specimens under leaves on ground.

Icius harti *Em.*—One female, on a board. August.

Astia vittata *Hentz.*—Common, the variety *niger* seen once.

Epiblemum scenicum *Clerk.*—Common on buildings. June.

Marptusa familiaris *Hentz.*—A few specimens under bark. July.

Admestina wheeleri *Peck.*—Several specimens, quite high on trees. July.

Hyctia pikei *Peck.*—One specimen from salt-grass. July.

Saitis pulex *Hentz.*—Common in woods. September.

Ergane borealis *Blk.*—(*E. tæniata* KEYS., *Hasarius hoyi* PECK., *Habrocestum latens* BKS.)—Not uncommon, sweeping in fields. Summer.

Synemosyna formica *Hentz.*—Not very common, beating shrubs.

Salticus albocinctus *Koch.*—One young specimen.

Synageles picata *Hentz.*—A few specimens, sweeping. September.

Synageles scorpiona *Hentz.*—Quite common, on small trees. July, August.

◆

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF JANUARY 2, 1895.

Held at the German American School.

President Beutenmüller in the chair. Ten members present.

On motion the reports of officers were postponed to the next meeting.

Mr. Dietz, the Chairman of Committee on Nominations for Officers for 1895, reported as follows:

For President, Rev. J. L. Zabriskie; Vice President, Chas. Palm Recording Secretary, L. H. Joutel; Corresponding Secretary, R. L. Ditmars; Treasurer, C. F. Groth; Executive Committee, G. W. J. Angell, G. Beyer, R. Ottolengui and C. Schaeffer.

On motion the Recording Secretary was instructed to cast an affirmative ballot, upon which the President declared the officers elected.

The retiring President then made a few remarks on the growth of the Society and its work during the previous year.

The following members also addressed the meeting: Messrs. Zabriskie, Groth, Dietz and Palm.

Adjournment.

MEETING OF JANUARY 15, 1895.

Held at the American Museum of Natural History.

Mr. Beutenmüller, Chairman *pro. tem.*, presiding. Ten members present.

The annual reports for 1894 of Treasurer and Recording Secretary were presented and approved, the former being referred to the Auditing Committing for action.

The Auction Committee reported that Mrs. Bradford donated about 1000 specimens.

Mr. Beutenmüller reported that Mrs. Bradford had sent a letter containing a check for $50, in memory of her son, G. D. Bradford. On motion a vote of thanks was extended to Mrs. Bradford.

Mr. Henry C. Bennett was proposed for membership by Mr. Beutenmüller.

Mr. R. L. Ditmars read a paper on a collecting tour in the Naugatuck Valley, Conn., and noted the discovery of a dipterous larva in the throat of a snake.

Adjournment.

MEETING OF FEBRUARY 19, 1895.

Held at the American Museum of Natural History, President Zabriskie in the chair. Nine members present.

The Committee on Constitution and By-Laws reported progress. Mr. Daecke, Chairman of Publication Committee, reported the following regulations for the JOURNAL: That a certain number of pages of each issue be devoted to popular notes; that a sum not exceeding $50 be used for plates and illustrations for the year 1895; that all bills relating to the publications of the Society shall be certified by the Chairman of the Publication Committee and Editor before being paid by the Treasurer; that all complete volumes of Vol. I. shall be sold only as volumes and not by single numbers; that abstracts of the proceedings of the Society be published in the JOURNAL.

On motion the foregoing regulations were accepted.

Mr. H. C. Bennett was elected an active member.

Mr. Ditmars proposed James Burchell for membership.

The death of Dr. R. H. Lamborn and B. Neumoegen were announced.

On motion Messrs. Beutenmüller and Palm were appointed to

Society approved of the measure outlined in the proposed act of incorporation as presented by the Council of the Scientific Alliance of New York.

Mr. J. Burchell was elected an active member.

On motion it was decided that a new Committee on By-Laws, consisting of five, be appointed. Messrs. Groth, Palm, Beutenmüller, Munch and Ditmars were appointed on this committee.

The President appointed Messrs. Daecke, Rabe, Joutel and Beutenmüller as members of the Publication Committee.

Mr. Daecke read a paper entitled "Remarks on the Expediency of Coöperation of the Members of the Society." After discussion.

Adjournment.

MEETING OF MARCH 19, 1895.

Held at the American Museum National History, Vice-President Palm in the chair. Twelve members present.

The following resolutions on the death of Mr. Neumoegen were read and approved.

"WHEREAS, The New York Entomological Society has heard with regret of the death of Mr. Berthold Neumoegen, which occurred January 2, 1895.

It is hereby:

Resolved, That in the death of Mr. Berthold Neumoegen this Society has lost one of its most prominent and energetic members, and whose loss will be deeply felt by all who knew him, and that in his death the world of science has lost one of its most eminent students and collectors of Lepidoptera, whose untiring zeal for the advancement of science has been recognized by his long list of papers which appeared in the various entomological publications of this country, and by the magnificent collection of Butterflies and Moths which has been garnered by him through conscientious efforts and carefulness."

Resolved, That a copy of this record be sent to the family of the deceased with our sincere condolence in their bereavement.

CHAS. PALM,
WM. BEUTENMÜLLER,
Committee.

On motion it was decided that an auction sale of insects for the benefit of the JOURNAL be held.

Mr. Beutenmüller read a paper entitled, "Notes on a Collecting Trip to Salt Lake, Utah," by the late Harry Edward.

Adjournment.

MEETING OF APRIL 2, 1895.

Held at the American Museum of Natural History, President Zabriskie in the chair. Eleven members present.

Mr. Dyar spoke on the arrangement of tubercles and setæ of Lepidopterous larvæ and their value in classification, in which he explained with the aid of diagrams how by means of modification of the number and shapes it was possible to classify Lepidoptera.

Mr. Beutenmüller spoke on the rearing of Lepidoptera.

Adjournment.

MEETING OF APRIL 16, 1895.

Held at the American Museum of Natural History, President Zabriskie in the chair. Ten members present.

On motion it was decided that $25 from the funds of the Society be appropriated toward the expenses of the JOURNAL for 1895.

Mr. Beutenmüller spoke on collecting insects at night. Discussed by Messrs. Dyar, Palm and Daecke.

Adjournment.

MEETING OF MAY 7, 1895.

Held at the American Museum of National History, President Zabriskie in the chair. Ten members present.

The Treasurer's report was read and accepted.

Mr. Münch reported on a field meeting held at Snake Hill, N. J.

Mr. Ditmars read a paper entitled "Mites parasitic on Snakes." He stated that he had found a species of *Ixodes* on *Boa constrictor* and that a species of *Ixodes*, one inch in length, is found on the large tropical snakes and turtles; also that a mite belonging to the family Gama- [redacted]

JOURNAL

OF THE

New York Entomological Society.

Vol. III. SEPTEMBER, 1895. No. 3.

NEW GENERA AND SPECIES OF TACHINIDÆ.

By D. W. Coquillett, Washington, D. C.

The genera referred to in the present paper may be distinguished as follows:

First vein bristly; sides of face bearing a row of macrochætæ.
    Apical cell open . . . . **Chætoplagia**, gen. nov.
    Apical cell closed and long petiolate . . . . **Metachæta**, gen. nov.
First vein bare.
    Sides of face bearing macrochætæ or bristly hairs . . . . 1.
    Sides of face bare . . . . 6.
1. Antennæ scarcely half as long as the face.
    Cheeks almost as broad as the eye-height . . . . **Phyto** *Desv.*
    Cheeks half as broad as the eye-height . . . . **Amobia** *Desv.*
  Antennæ at least three-fourths as long as the face.
    Eyes distinctly pilose . . . . 2.
    Eyes bare or microscopically sparsely pilose . . . . 3.
2. Posterior end of hind crossvein nearer the wing margin than to the small crossvein . . . . **Gædiopsis** *B. B.*
  Posterior end of hind crossvein twice as far from the wing margin as from the small crossvein . . . . **Cyrtophleba** *Rond.*
3. Sides of face bearing a row of macrochætæ . . . . 4.
  Sides of face destitute of macrochætæ, bearing only bristly hairs . . . . 5.
4. Lower end of hind crossvein almost opposite the small crossvein.
    Paraplagia *B. B.*
  Lower end of hind crossvein midway between the small crossvein and the wing margin . . . . **Opsidia**, gen. nov.
5. Last section of fifth vein nearly as long as the penultimate section.
    Metaplagia, gen. nov.
  Last section less than half as long as the penultimate section.
    (*Gymnoprosopa* Town.) **Araba** *Desv.*
6. Eyes distinctly pilose . . . . **Nemoræa** *Desv.*
  Eyes bare or microscopically sparsely pilose . . . . 7.
7. Facial ridges bristly at least on their lower two-thirds . . . . **Degeeria** *Meig.*
  Facial ridges never bristly on more than the lower third 8

8. Cheeks nearly as broad as the eye-height . . . . **Paraphyto,** gen. nov.
Cheeks less than half as broad as the eye-height . . . . 9.
9. Apical cell ending close to the extreme wing-tip . . . . **Myiobia** *Desv.*
Apical cell ending far in front of the wing-tip . . . . 10.
10. Hind tibiæ outwardly rather densely ciliate with short bristles of nearly an equal length . . . . **Argyrophylax** *B. B.*
Hind tibiæ unequally bristly, not ciliate . . . . **Gymnoprosopa** *Town.*

Chætoplagia, gen. nov.

First, third and fifth veins bristly; hind crossvein slightly beyond the middle between the small and the bend, the latter rectangular and appendiculate; posterior end of hind crossvein midway between the small and the tip of the fifth vein; apical cell open, ending midway between the second vein and extreme tip of wing. Frontal bristles in a single row, descending on sides of face nearly to the cheeks; anterior ocellar bristles directed obliquely forward; antennæ as long as the face, the third joint five times as long as the second; arista bare, the penultimate joint not longer than broad; face in profile slightly convex, each side at narrowest point about one-eighth as wide as the median depression, sparsely covered with bristly hairs; ridges straight, widely diverging below; vibrissæ widely separated, inserted on the oral margin, only two or three bristles above each; cheeks one-sixth as wide as the eye-height; eyes bare; proboscis fleshy, the portion beyond the basal articulation shorter than height of head; labella large; palpi well-developed, subclavate. Abdomen subcylindrical of four segments. Hind tibiæ not ciliate. Type, the following species:

Chætoplagia atripennis, sp. nov.

♀—Black, the second antennal joint and palpi brownish yellow. Front at vertex twice as wide as either eye, sides of front and face silvery pollinose; frontal bristles curving more or less backward, those below the arista directed downward; arista thickened on the basal two-thirds. Thorax lightly grayish pollinose, the front end marked with four black vittæ; three postsutural and three sternoplural macrochætæ, the scutellum bearing a long marginal and shorter basal and apical pair.

crossvein nearly midway between the wing-margin and the small crossvein; third vein terminates midway between the second and the wing-tip. Antennæ nearly as long as the face, the third joint nearly three times as long as the second; arista bare, the penultimate joint slightly longer than broad; anterior ocellar bristles directed forward, frontal bristles in a single row descending to the lower end of the eyes; sides of face otherwise bare, each at narrowest point hardly one-sixth as wide as the median depression; face strongly retreating below, in profile concave, ridges strongly diverging below, vibrissæ inserted on the oral margin, widely separated, only one or two bristles above each; eyes bare; cheeks nearly half as broad as the eye-height; proboscis fleshy, the portion beyond the basal articulation scarcely half as long as height of head, labella large; palpi rather small, clavate. Abdomen long-ovate, of four segments. Hind tibiæ not ciliate. Type, the following species:

Metachæta atra, sp. nov.

♀—Black, the palpi and tip of proboscis yellow. Front at vertex one and one-half times as wide as either eye, three frontal bristles in each row curving backward, two pairs of orbital bristles; arista thickened on slightly more than the basal half. Body wholly shining, not pollinose; three postsutural and two sternoplural macrochætæ, scutellum bearing three rather long marginal pairs and two short discal pairs; second and third abdominal segments each with a discal and a marginal pair of macrochætæ, the fourth with a discal pair and scattered ones on the apical third. Wings blackish along the costa and crossveins, elsewhere gray; first vein bristly on nearly its entire length, the third bristly to slightly beyond the small crossvein; calypteres white. Front tarsi considerably dilated, claws and pulvilli less than half as long as the last tarsal joint. Length 4 to 5 mm.

Franconia, N. H. (Mrs. A. T. Slosson); and Northern Illinois (Dr. W. A. Nason). Seven specimens.

Phyto setosa, sp. nov.

♀—Black, including the palpi, face largely reddish brown. Front at vertex as wide as either eye, only one frontal bristle in each row curving backward, two pairs of orbital bristles, frontals descending to base of second antennal joint; antennæ less than half as long as the face, the second and third joints subequal in length, arista thickened on its basal fourth; sides of face bearing a row of macrochætæ, each side at narrowest part over one-third as wide as the median depression, the latter distinctly carinate; vibrissæ inserted the length of the second antennal joint above the oral margin, ridges bare; cheeks nearly as broad as the eye-height; proboscis short, fleshy, palpi clavate. Thorax grayish pollinose, marked with four black vittæ; three postsutural and three sternoplural macrochætæ, scutellum bearing three long marginal pairs. Abdomen grayish pollinose; first segment with a marginal pair of macrochætæ, second with a discal and a marginal pair, third and fourth each with a discal pair and a marginal row. Wings subhyaline, third vein bristly nearly halfway to the small crossvein, the others bare; costal spine longer than the small crossvein, apical cell closed in the margin at two-thirds the distance from the second vein to the wing-tip; calypteres white. Length 6 mm.

Northern Illinois (Dr. W. A. Nason). A single specimen.

Amobia *Desv.* (1830).—Both Schiner (Fauna Aust. I, 502) and Brauer and Bergenstamm (Zweifl. Kais. Museums Wien, VI, 226) state that this genus is equivalent to *Macronychia* Rond. (1859), the first mentioned author alleging that the same species served as the type of both. *Amobia*, being much the older term, must be retained for this genus. Brauer and Bergenstamm incorrectly spell it *Ammobia*, a term previously employed in the Hymenoptera by Billberg (Enumeratio Insectorum, 105, 1820).

Amobia californica, sp. nov.

♀—Black, the palpi yellow, lower part of face tinged with reddish yellow. Front at vertex as broad as either eye, frontal bristles descending slightly below base of antennæ, the uppermost in each row curving backward, the next outward; others inward, two pairs of orbital bristles; antennæ half as long as the face, the third joint not longer than the second; arista thickened to the middle, the penultimate joint slightly longer than broad; sides of face covered with short bristly hairs, each side nearly half as wide as the median depression; vibrissæ inserted half the length of the second antennal joint above the oral margin, two or three bristles above each; cheeks over one-third as broad as the eye-height; proboscis rigid, the portion beyond the basal articulation nearly as long as height of head, labella very small, palpi clavate. Thorax gray pollinose, marked with four black vittæ; three postsutural and three sternoplural macrochætæ, scutellum bearing two long marginal pairs and a short apical one. Abdomen subshining, thinly gray pollinose, first and second segments each with a marginal pair of macrochætæ, third with a marginal row, the fourth with a subapical row. Wings subhyaline, third vein bearing three or four bristles at the base, the others bare, costal spine minute; calypteres white. Length 9 to 11 mm.

Los Angeles Co., Cal. Two specimens in April.

Gædiopsis flavipes, sp. nov.

tinged with gray at the base and along the costa, third vein bearing two or three bristles at the base, the others bare, costal spine minute, bend of fourth vein not appendiculate. Length 7.5 mm.

Mobile, Alabama (C. W. Johnson). A single specimen taken October 22, 1894, in Mr. Johnson's collection.

Cyrtophleba horrida, sp. nov.

♀—Black, the palpi yellow, the first two joints of antennæ yellowish brown. Front at vertex as broad as either eye, frontal bristles descending nearly to tip of second antennal joint, four or five in each row curving backward; two pairs of orbital bristles, a shorter one between them and a row of six macrochætæ in front of them, extending on the face nearly to lower end of eyes, a few bristly hairs among them; antennæ about three-fourths as long as the face, the third joint one and one-third times as long as the second; arista thickened to the middle, the penultimate joint slightly longer than broad; cheeks one-fourth as wide as the eye-height; vibrissæ inserted on the oral margin, two or three bristles above each; proboscis very short and fleshy, palpi clavate; eyes rather thinly but quite long pilose. Thorax gray pollinose, marked with four black vittæ; three postsutural and three sternopleural macrochætæ, scutellum bearing four marginal pairs, a widely separated backwardly directed discal pair and with two pairs of erect ones between them. Abdomen with a brassy tinge, thinly grayish pollinose; second segment bearing a discal and a marginal pair of macrochætæ, third with a discal pair and marginal row, fourth with a discal pair, a median and a marginal row. Wings hyaline, tinged with gray at base and along the costa; third vein bristly almost to the small crossvein, the others bare; hind crossvein nearly midway between the small and the bend, the latter with a long appendage; posterior end of hind crossvein less than one-third of distance from the small to the wing-margin; calypteres white. Front pulvilli two-thirds as long as the last tarsal joint.

♂—Differs from the ♀ as follows: Antennæ four-fifths as long as the face, fourth abdominal segment destitute of the discal pair of macrochætæ, front pulvilli longer than the last tarsal joint. Length 7.5 mm.

New Bedford, Mass. (Dr. G. de N. Hough); Ithaca, N. Y., April 25, (F. H. Chittenden); and Northern Illinois, June 2, 1894 (Dr. W. A. Nason). Two males and two females.

Paraplagia cinerea, sp. nov.

♀—Differs from above description of *Cyrtophleba horrida* as follows: Front nearly twice as wide as either eye, frontal bristles descending to lowest fourth of third antennal joint, sides of face otherwise bare, no row of macrochætæ in front of orbital bristles; antennæ four-fifths as long as the face; arista thickened on the basal three-fourths, the penultimate joint twice as long as wide; eyes bare. Scutellum bearing only three pairs of marginal macrochætæ. Abdomen destitute of a brassy tinge, fourth segment with an irregular discal and marginal row of macrochætæ. Third vein bristly to beyond the discal cell, posterior end of hind crossvein nearly opposite the small.

♂—Same as the ♀ except that the front pulvilli are as long as the last tarsal joint. Hypopygium projecting one-third the length of the fourth abdominal segment beyond the latter. Length 6 to 8 mm.

Northern Illinois (Dr. W. A. Nason), and Dist. Columbia in July, taken by the writer. One male and two females.

Opsidia, gen. nov.

Head swollen, frontal bristles continuous from the occiput, in single rows, descending to base of second antennal joint, two backwardly curving macrochætæ on vertex outside of each row, the anterior ones slightly in advance of the anterior ocellus; anterior ocellar bristles curving obliquely forward, sides of front and of face covered with short bristly hairs, the latter also bearing a row of short macrochætæ outside of the ridges which are almost parallel; face in profile straight, greatly retreating below, the sides at narrowest part each as wide as the median depression; vibrissæ inserted almost on the oral margin, two or three short bristles above each; antennæ six-sevenths as long as the face, the third joint five times as long as the second; arista bare, the penultimate joint not longer than broad; eyes bare; cheeks one-fourth as wide as the eye-height; proboscis rather slender, the portion beyond the basal articulation less than half as long as height of head; palpi well-developed, clavate. Third vein bearing four bristles at the base, the others bare; hind crossvein near last third of distance between the small and the bend, the latter with a long appendage; posterior end of hind crossvein nearly midway between the small and tip of fifth; apical cell open, ending midway between the second vein and the extreme tip of wing. Type, the following species:

Opsidia gonioides, sp. nov.

♀—Black, the first two antennal joints largely, and the palpi, yellow. Front at vertex twice as wide as either eye, two pairs of orbital bristles, arista thickened on the basal five-sixths. Thorax gray pollinose, marked with four black vittæ; three postsutural and two sternopleural macrochætæ, scutellum bearing three long marginal pairs. Abdomen gray pollinose, second segment with a marginal pair, the third and fourth each with a marginal row of short macrochætæ. Wings hyaline, costal the basal articulation not half as long as height of head; palpi well developed, clavate. Third vein bristly nearly to the small crossvein, the others bare; hind crossvein nearly midway between the small and the bend, the latter rectangular and bearing a long appendage; posterior end of hind crossvein almost opposite the small; apical cell open, ending nearly midway between the second vein and extreme tip of wing. Type, the following species:

Metaplagia occidentalis, sp. nov.

♂—Black, the first two antennal joints and the palpi yellow. Front at vertex nearly twice as wide as either eye, two pairs of orbital bristles, arista thickened to the tip, which is pointed. Thorax gray pollinose, marked with four black vittæ; three postsutural and three sternopleural macrochætæ, scutellum bearing three long marginal pairs. Abdomen subshining, bases of last three segments whitish pollinose; second segment bearing a marginal pair of macrochætæ, third with a marginal row, the fourth with a submarginal and a marginal row. Wings hyaline, costal spine minute, calypteres white. Front claws and pulvilli much longer than the last tarsal joint, hind tibiæ not ciliate. Length 7 mm.

San Diego Co., Cal. A single specimen, captured by the writer.

Araba tergata, sp. nov.

♂—Black, including the palpi. Front wholly silvery pollinose, at vertex slightly wider than either eye, frontal bristles descending to middle of second antennal joint, near the middle the two rows are separated from each other fully eight times as far as from the nearest eye, two pairs of orbital bristles; sides of face silvery, bearing short bristly hairs, ridges bristly nearly their entire length; antennæ nearly as long as the face, the third joint five times as long as the second; arista thickened almost to the tip, the penultimate joint not longer than wide; cheeks nearly one-fourth as broad as the eye-height; proboscis short, fleshy, palpi clavate. Thorax opaque, black in middle of front part to behind the suture, the remainder light gray pollinose; three postsutural and two sternopleural macrochætæ, scutellum bearing two long marginal pairs. Abdomen whitish pollinose on bases of last three segments and hind angles of the first; second segment with a marginal pair of macrochætæ, the third and fourth each with a marginal row. Wings hyaline, third vein bearing three bristles at its base, the others bare, costal spine minute; calypteres white. Claws and pulvilli scarcely one-third as long as the last tarsal joint.

♀—Differs from the ♂ as follows: Frontal vitta yellowish brown, sides of front grayish pollinose, the two rows of frontal bristles near the middle separated from each other from four times to less than twice as far as from the nearest eye. Thorax yellowish gray pollinose, marked with four black vittæ. Abdomen grayish pollinose, first three segments each marked with a posterior row of three black spots, sometimes more or less united, the fourth black on the apex. Length 4 to 6 mm.

Northern Illinois (August 2 and 16, 1894; Dr. W. A. Nason), and Los Angeles Co., Cal., in July, captured by the writer. Two males and two females.

Nemoræa labis, sp. nov.

♀—Black, the antennæ, palpi and fourth abdominal segment except its extreme base, yellow; front coxæ, front and middle trochanters, and the tibia, yellowish brown, front at vertex slightly narrower than either eye, frontal bristles descending nearly to tip of second antennal joint, two in each row curving backward, two pairs of orbital bristles, sides of front nearly destitute of pollen, a large yellowish spot followed by an opaque black one each side between the front and the golden pollinose sides of face which are bare and on lower part are destitute of yellow pollen; antennæ slightly over three-fourths as long as the face, the third joint as long as the second, only slightly longer than wide; arista thickened nearly to the middle, the penultimate joint not longer than wide; vibrissæ inserted nearly half the length of the second antennal joint above the oral margin, two or three bristles above each; cheeks two-thirds as broad as the eye-height, eyes thickly pilose; proboscis short, fleshy, palpi clavate. Thorax gray pollinose, marked with four black vittæ; three postsutural and three sternopleural macrochætæ, scutellum bearing three long marginal pairs. Abdomen lightly gray pollinose and with reflecting blackish spots; first two segments destitute of dorsal macrochætæ, third with a marginal row, the fourth with scattered ones. Wings hyaline, tinged with gray basally and in the costal cell, a brown cloud on the small crossvein; costal spine minute, bend of fourth vein bearing a long stump; calypteres smoky, bordered with white. Pulvilli two-thirds as long as the last tarsal joint. Length 8.5 mm.

Washington. A single specimen from Prof. O. B. Johnson.

Medina **~~Degeeria~~ washingtonæ,** sp. nov.

♀—Black, including the palpi. Front at vertex nearly twice as wide as either eye, frontal bristles descending to middle of second antennal joint, four in each row curving backward; two pairs of orbital bristles; sides of face bare except on upper fourth, ridges bristly on lower three-fifths; antennæ over three-fourths as long as the face; the third joint three times as long as the second; arista thickened to slightly beyond the middle, the penultimate joint three times as long as broad; cheeks slightly

Paraphyto, gen. nov.

Frontal bristles descending to insertion of antennæ, anterior ocellar bristles directed forward; antennæ two-thirds as long as the face, the third joint one and one-third times as long as the second; arista short pubescent, the penultimate joint not longer than broad; face in profile strongly concave, sides bare, each at the narrowest point almost half as wide as the median depression; ridges strongly arcuate, diverging below; vibrissæ widely separated, inserted half the length of the second antennal joint above the oral margin, a few short bristles above each; cheeks five-sixths as broad as the eye-height, covered with bristly hairs; head at insertion of the vibrissæ slightly longer than at base of antennæ; eyes bare; proboscis rigid, rather slender, the portion beyond the basal articulation nearly as long as height of head, labella soft, of medium size; palpi well developed, clavate. Abdomen oblong, as broad as the thorax. Third vein bristly over half-way to the small crossvein, the others bare, apical cell open, ending midway between the second vein and the extreme tip of wing, bend of fourth vein almost rectangular, destitute of an appendage, hind crossvein at four-fifths of distance between the small and the bend, its posterior end nearer to the wing-margin than to the small crossvein. Type, the following species:

Paraphyto chittendeni, sp. nov.

♂—Black, the second antennal joint and palpi yellow, abdomen, except a vitta on the first three segments, brownish red. Front at vertex as wide as either eye, with the face silvery pollinose, no orbital bristles. Thorax gray pollinose, marked with three black vittæ; three postsutural and two sternopleural macrochætæ, scutellum bearing three long marginal pairs. Abdomen thinly gray pollinose; first two segments destitute of dorsal macrochætæ, the other two each with a marginal row; hypopygium consisting of three segments. Femora unusually robust, more than twice as thick as the tibiæ, middle and hind tibiæ distinctly arcuated, the latter not ciliate outwardly, under side of femora and inner side of middle and hind tibiæ toward their tips rather densely long black pilose; pulvilli as long as the last tarsal joint. Wings hyaline, tinged with yellow basally and along the costa. Length 11 mm.

Ithaca, N. Y. A single specimen from Mr. F. H. Chittenden, after whom I take pleasure in naming this interesting species.

Myiobia thecata, sp. nov.

♂—Front at vertex almost half as wide as either eye, yellowish gray pollinose, the vitta brownish black; frontal bristles descending to basal fourth of the second antennal joint, four in each row directed backward; no orbital bristles; antennæ four-fifths as long as the face, yellow, apex of the third joint brown, this joint almost twice as long as the second; arista thickened on the basal fifth, short hairy, some of the hairs slightly longer than its greatest diameter; sides of face bare, a single bristle above each vibrissa; cheeks one-tenth as broad as the eye-height; proboscis slender, rigid, yellow except at base, the portion beyond the basal articulation three-fifths as long as height of head, its basal fourth enclosed in a large white membraneous sheath; labella rather large; palpi yellow, slender, slightly longer than the antennæ. Thorax black, yellowish gray pollinose, marked with four black vittæ; three postsutural and three sternopleural macrochætæ, scutellum bearing two long marginal pairs; scutellum grayish black, purer black on the sides. Abdomen light yellow, the apex reddish yellow, a dorsal vitta and base of fourth segment black; second segment with a marginal pair of macrochætæ, the third and fourth each with a marginal row. Legs yellow, tibiæ tinged with brown, tarsi black; pulvilli one-third as long as the last tarsal joint. Wings hyaline, a bristle at base of third vein, the others bare; costal spine minute, apical cell open, ending the length of the small crossvein in front of the extreme wing-tip.

♀—Differs from the ♂ as follows: Front nearly as wide as either eye, two pairs of orbital bristles, third antennal joint one and one-third times as long as the second, abdomen reddish yellow, middle of first segment and narrow vitta on the second, brown. Length 6 mm.

Bucks and Delaware Cos., Pa. (Aug. 19, 1892, and June 25, 1893; C. W. Johnson). One specimen of each sex.

Argyrophylax rostrata, sp. nov.

♂—Black, the palpi, first two joints of antennæ, scutellum except at base, apex and sides of abdomen except hind angles of the third segment, yellow. Front at vertex nearly as wide as either eye, frontal bristles descending to tip of second antennal joint, three in each row curving backward, a row of short macrochætæ between them and the eyes, extending to base of antennæ, no orbital bristles, anterior ocellar bristles well developed, sides of front grayish pollinose; antennæ slightly over three-fourths as long as the face, third joint one and one-half times as long as the second; arista thickened to the middle, the penultimate joint one-half longer than broad; face in profile slightly concave, the sides bare, white pollinose, ridges bristly on the lowest fourth; proboscis slender, rigid, the portion beyond the basal articulation as long as height of head, labella horny, not thicker than the proboscis proper. Thorax gray pollinose, marked with four black vittæ; four postsutural and four sternopleural macrochætæ, scutellum bearing three long marginal pairs and a short apical one. First two segments of abdomen each bearing a marginal pair of macrochætæ, gray pollinose, the vittæ indistinct; three postsutural and two sternopleural macrochætæ, scutellum bearing three long marginal pairs. Abdomen gray pollinose, three rows of spots, united on last segment, 2d and the venter, black; first two segments each with a marginal pair, the other two each with a marginal row of macrochætæ. Last two joints of front tarsi unusually slender, the under side of the dilated two preceding joints bearing a large cluster of long black hairs; claws of front tarsi scarcely one-third as long as the elongated last tarsal joint. Wings hyaline, costal spine longer than the small crossvein, calypteres white.

♀—Differs from the ♂ as follows: Frontal vitta yellowish pollinose, sides of face bearing short bristly hairs, front tarsi dilated, destitute of a cluster of hairs. Length 7 mm.

Avalon, N. J. (June 29, 1894; C. W. Johnson), and Northern Illinois (Dr. W. A. Nason). One specimen of each sex.

◆

NEW NORTH AMERICAN TETTIGINÆ.—II.

By Albert P. Morse, Wellesley, Mass.

Tettigidea armata, sp. nov.

Very similar to *T. acuta* Morse (Journ. N. Y. Ent. Soc. III, 15), differing in having a less projecting vertex, and a distinctly or strongly rugulose pronotum with sharp carinæ. The anterior margin of the pronotum is usually more produced, with excavated sides, and terminates in a sharply pointed cusp. The median carina is distinct, sharp, nearly horizontal, with sometimes a slight depression opposite the tegmina. In the type the wings and pronotum pass the hind femora considerably but a short-winged form occurs, described below as *depressa*.

1 pair (*in coitu*), 4 ♀ ♀, Vigo Co., Ind., collected by Prof. W. S. Blatchley. 1 ♀, Dallas, Texas, Boll (M. C. Z.). 1 ♂, 1 ♀, "Tettig. lateralis," no locality, in Scudder's collection; probably this species.

Antenna.		Hind fem.	Pronotum.	Pron.>H. fem.	W'gs.>Pron.	Total.
♂	3.5	6.	11.5	1.7	.7	12.8
♀	4.	7.-8.	13.8-16.3	2.5-3.5	1.1-1.7	15.4-17.7
♀ (Tex.)	5.	8.5	16.5	2.8	1.2	18.

T. armata depressa, var. nov.

This is doubtless the short-winged form of *armata*, differing only in having the pronotum equalling or not reaching the tip of the hind femora and the wings more or less abortive; the dorsum of the pronotum is sinuate in profile, being more or less depressed at tip and opposite shoulders.

1 ♀, Vigo Co., Ind., Blatchley. 1 ♂, Jacksonville, Fla., Ashmead; 1 ♀, New Orleans, La., Coleman, received from Prof. Bruner. 1 ♀, St. John's River, Fla., J. A. Allen (M. C. Z.). 1 ♀, Ft. Reed, Fla., collected by Comstock, determined as "Tettig. lateralis" by

Scudder (Cornell Univ.). The ♂ from Florida was referred by Bruner with some doubt to *Batrachidea flavo-notata.*

Antenna.		Hind fem.	Pronotum.	Pron.<H. fem.	Total.
♂	—	5.5	7.7	1.5	8.5
♀	4.	7.–8.	11.–12.	0.–.5	11.5–13.

Tettigidea spicata, sp. nov.

A small, slender, southern species, intermediate in structure of vertex between *apiculata* and *armata*, but more nearly allied to the latter. The vertex is more projecting than in *armata*, the body is narrower across the shoulders, the lateral carinæ of pronotum are but slightly developed, the median carina is less distinct, and the disc is more finely rugulose.

1 ♂, Georgia (Henshaw); 2 ♀ ♀ Florida, Morrison (Bruner).

Antenna.		Hind fem.	Pronotum.	Pron.>H. fem.	W'gs.>Pron.	Total.
♂	3.3	5.5	10.5	1.7	.7	11.6
♀	4.	7.6	14.4	2.5	.7–1.	15.6–16.2

Restoration of Harris' name to the New England species of Tettigidea.

Continued study of the group of forms commonly referred to under the names of *Tettigidea lateralis* and *polymorpha* convinces me that it is composed of several distinct species, not, however, to be distinguished by the length of pronotum and wings as has so commonly been done, but by characters presented in the form of the head and pronotum aside from mere length of the latter. As has been noted above, several species may be readily separated into a group having the front margin of the pronotum produced into a sharp, pointed cusp; in the remainder the margin is either rounded or obtuse-angulate.

To this latter group belong the forms described by Say as *Acrydium* specimens were procured, thus rendering necessary the restoration of Harris' name to the New England species. As a designation for the long-winged form is desirable, I here propose for it the name *pennata*, and, believing the two forms to be one species, its full name becomes *T. parvipennis pennata*.

In arriving at these conclusions I have been especially aided by an excellent series of specimens collected in Indiana by Prof. W. S. Blatchley, some of which were obtained directly from him through exchange or for examination, and others were kindly loaned by Dr. J. L. Hancock, of Chicago. I wish to call attention to the importance, in in some cases even the necessity, of series of specimens in order to arrive at a definite knowledge of the group.

I have examined specimens of *parvipennis* from New England, New York, New Jersey, Pennsylvania, West Virginia, Indiana, Illinois, Minnesota and Ottawa, Canada. In Vigo Co., Ind., it is about equally common with another dimorphic species included under the name of *lateralis* (and *polymorpha*) by Blatchley. This latter species I have seen also from Maryland, West Virginia, southern Illinois, Kentucky, Tennessee, North Carolina, Mississippi, Louisiana, Texas. For the present it may be called as heretofore though it is doubtful if it is identical with the Florida form described by Say. Small series of specimens before me from Florida, Georgia and North Carolina present certain differences from it and between themselves which may be regarded as either varietal or specific, at present it is impossible to say which is the more probable. As soon as time and material permit I intend to supplement these descriptions by presenting drawings of these various forms and of all the species of the genus obtainable, whose discrimination in the absence of figures is attended with much difficulty.

The characters of *parvipennis* which distinguish it most readily from the other species are the strongly projecting vertex, less prominent eyes (see Morse, Notes N. E. Acrid. I, *plate:* Psyche, Oct., 1894) and stouter antennæ. The lateral carinæ of the pronotum are usually but slightly sinuate, the anterior portions being distinctly divergent and passing rather smoothly into the humeral portions. The antennæ are slightly flattened, the joints of the middle third not over two or two and-a-half times as long as broad. In the other species the antennæ are filiform, and the joints of the middle third are three to four times as long as broad; the vertex is less projecting, the eyes more prominent, and in some the lateral carinæ are parallel in the anterior part of their course.

THE EVERSIBLE REPUGNATORIAL SCENT GLANDS OF INSECTS.

PLATE V.

BY A. S. PACKARD.

While these eversible glands are not found in marine or aquatic Arthropods as Crustacea or Merostomata (Limulus), they are often present in the air-breathing forms, especially insects. In the winged insects they are of frequent occurrence, existing under great variety of form, varying greatly in position, and appearing usually to be in immediate relation with their active volant habits. Their presence is in direct adaptation to the needs and habits of their possessors, and being repellant, warning, or defensive structures, the odors they secret being often exceedingly nauseous, they appear to have been called into existence in direct response to their biological environment. The fact that these singular organs do not exist in marine or aquatic Crustacea suggests that the air-breathing, aerial or volant insects by these eversible glands, usually in the form of simple evaginable hypodermic pouches, are enabled to protect themselves by emitting an infinitesimal amount of an offensively odorous fluid or ether-like spray which charges the air throughout an extent of territory which may be practically illimitable to the senses of their enemies. The principle is the same as in the mephitic sulphuretted oil ejected by the skunks, the slight quantity these creatures give out readily mixing with and charging the atmosphere within a radius of many miles of what we may call the center of distribution.

As is now well known, the very delicate, attenuated highly volatile coarser than the particle of mercaptan which can be detected by the nose.

In those Arachnida which are provided with poison glands, these scent glands are absent, but in certain Acarina and Linguatulidæ, which have no poison glands, there are various oil glands, stigmatic glands, as well as scent glands, and in seizing a Thelyphonus with the forceps I have observed it to send out from each side of the body a jet of offensive spray.

We find not infrequently in Myriopods (Polydesmidæ, Julidæ, and Glomeris) repugnatorial or the so-called cyanogenic glands, which are either paired, opening on the sides of the body, or form a single row along the median line of the under side of the body. Leidy describes and figures the spherical glands of *Julus marginatus*, of which there are fifty pairs. These glands have been regarded as modified nephridia, but are more probably coxal glands, and the homologues of the parapodial glands of annelid worms.

True coxal glands occur in *Scolopendrella immaculata* on the 3d to 11th and the last segment, on the inner side of the base of the legs. Homologous glands also occur in the same position in *Campodea staphylinus* (also in *C. cookei* and *C. mexicana*) on the 1st to 8th abdominal segments, and Oudemans has described a pair of eversible sacs on each side of segments 1 to 7 of Machilis. These eversible sacs in the Synapterous insects are evidently modified coxal glands, and are probably repugnatorial as well as respiratory in function.

The apparatus consists of an eversible gland, composed of hypodermic cells, usually retracted by a slender muscle and with an efferent passage, but the glands vary greatly in shape and structure in different insects. In some cases these fœtid glands appear not to be the homologues of the coxal glands, but simply dermal glands.

These repugnatorial glands are of not infrequent occurrence in the lower or more generalized winged insects, and in situation and appearance are evidently the homologues of the coxal glands of the Symphyla and Synaptera.

In the ear-wigs (*Forficula* and *Chelidura*) Meinert has detected a pair of what he calls fœtid glands at the posterior margin of the dorsal plates of the second and third abdominal segments.

Vosseler also describes the same glands as consisting of a retort-shaped sac, in whose walls are numerous small epidermal cells and large single glandular cells provided with an efferent passage, the fluid being forced out by the pressure of the dermal muscles, one acting specially to retract the gland. The creature can squirt to a distance of five and even ten centimeters (4 inches) a yellowish brown liquid or emulsion with the odor of a mixture of carbolic acid and creosote.

The large eversible dorsal glands of the Blattidæ, since they contain numerous hairs, which, when everted, are fan-like or like tufts, serve, as in the spraying or scent apparatus, to disseminate the odor, might be classified with the alluring unicellular scent glands or *duftapparat* of other insects, as they are by some authors; but as the glands are large and compound they may prove to be the homologues of the coxal glands rather than of the dermal glands.

Evaginable organs in the Blattids were first observed by Gerstæcker in both sexes of Corydia; they are yellowish white, covered with hairs, and are thrust out from between the dorsal and ventral plates of the first and second abdominal segments.

In the cockroach (*P. orientalis*) Minchin detected two pouch-like invaginations of the cuticle, lying close on each side of the middle line of the body between the fifth and sixth tergites of the abdomen. They are lined by a continuation of the cuticle, which forms, within the pouches, numerous stiff, branched, finely pointed bristles, beneath which are a number of glandular epithelial cells. In the male nymph of *P. decorata* he also found beside these glandular pouches "an additional gland, opening by a tubular duct under the intersegmental membrane between the fifth and sixth terga above the glandular pouch of each side, and extending forward into the body cavity. The gland and its duct are proliferations of the hypodermis, and there is no invagination of the cuticle." These eversible glands are most complicated in *Phyllodromia germanica*. While it is absent in the female, in the male it is closely similar to the long slender eversible hairy appendages or scent organs of certain Arctian and Syntomid moths.

I have found the external median wart with lateral lids or flaps in between the fifth and sixth tergites of *Platyzosteria ingens* Scudder, a large wingless Blattid living under the leaf scars of the cocoanut tree in Southern Florida, but was unable to detect them in *Polyzosteria* or in *Blabera* from Cuba, or in another genus from Cordova, Mexico.

In another group of Orthoptera, the Phasmidæ, occur a pair of dorsal prothoracic glands, each opening by a pore and present in both sexes. In the walking-stick, *Anisomorpha buprestoides*, ♂ and ♀, these openings are situated on each side of the prothorax at its upper anterior extremity, situated at the bottom of a large deep pit. When seized it discharged a "milky white fluid from the pores of the thorax, diffusing a strong odor, in a great measure like that of the common Gnaphalium or life everlasting" (Peale in Say's American Entomology, I, p. 84). Boll states that the females when captured "spurt from the prothorax, somewhat after the manner of bombardier beetles, a strong vapor, which slightly burnt the skin; when the females were seized by the males a thick fluid oozed from the same spot." Scudder describes these glands in another Phasmid (*Autolyca pallidicornis*) as two straight, flattened, ribbon-like bodies, with thick walls, broadly rounded at the end, lying side by side and extending to the hinder end of the mesothorax. In *Anisomorpha buprestoides* the glands are of the same size and shape (Scudder, Psyche, I, p. 137). In *Diapheromera femorata* the repugnatorial foramina are very minute, and the apparatus within consists of a pair of small obovate or subfusiform sacs, one on each side of the prothorax, about 1 mm. in length, with a short and very slender duct opening externally at the bottom of the pit (Scudder).

In the Mantidæ these seem to be genuine coxal glands, as there is a pair situated between the coxæ of the first pair of legs. An evaginable organ like a wart, with a glandular appearance, occurs on the hind femora of the Acrididæ in a furrow on the under side into which the tibia fits, about one-fourth from the base (Psyche, III, p. 32).

In the male cricket, the anal odoriferous glands are small lobes opening into a reservoir on each side of the rectum (Dufour). Homologous glands also occur in the Coleoptera and Lepidoptera, and may prove to be coxal glands.

Most Hemiptera or bugs send out a fœtid or nauseous odor due to a fluid secreted by a single or double yellow or red pear-shaped gland, situated in the middle of the mesothoracic segment, and opening between the hinder or third pair of coxæ. In *Belostoma* Leidy describes these glands as consisting of two rather long cœcal tubes situated in the metathorax, beneath the other viscera, extending backwards into the abdomen, and opening between the coxæ of the third pair of legs. Some bugs, however, emit an agreeable odor, that of Lysomastes resembling that of a fine bergamot pear (Siebold). The fluid given out by the European fire-bug (*Pyrrhocoris apterus*) has a sweetish smell, like ether. In the nymph there are three pairs of dorsal glands, on abdominal segments 2–5, which are atrophied in the mature insect. In the bed-bug, the nymph has three odoriferous glands, each with paired openings in the three basal abdominal segments respectively; and situated on the median dorsal line, being arranged transversely at the edge of the tergites, but after the last molt these are aborted, and replaced by the sternal metathoracic glands (Künckel).

Certain beetles are endowed with eversible repugnatorial glands. *Eleodes gigantea* and *E. dentipes* of both sexes are said by Gissler to possess these glands. When teased "they stand on their anterior and middle legs, holding the abdomen high up and spurting the contents of the glands right and left." The glands (Plate V, Fig. 1) are two reddish brown, somewhat bilobed sacs, and extend from the base of the last up to the middle of the second abdominal segment, with an average length of 6.5 mm. The liquid stains the human skin, has an acid reaction, with a peculiar, "intensely penetrant odor, causing the eye to lachrymate. It is soluble in water, alcohol and ether. Boiled with concentrated sulphuric acid and alcohol an ethereal aromatic vapor is produced, indicating the presence of one or more organic acids, though neither formic or acetic acid could be detected. Williston has observed the same habits in seven other species of *Eleodes*, all ejecting a pungent lous aspect to the surface. These lobules are composed of as many as fifty unicellular glands, each of which is composed of four parts: (1) A radiated vesicle, (2) a central sac, giving rise (3) to a fine excretory tube, and (4) a sheath near the origin of the excretory tube. These are all modifications of the cytoplasm of the cell with its reticulum; the nucleus with its chromosomes is also present, but situated on one side of the central sac. The fine excretory tubules form a bundle passing down into the mouth of each lobule.

Similar glands, though usually smaller, which have not been carefully examined, occur in *Carabus* (Fig. 3) and *Cychrus*, which eject from the vent a disagreeable fluid containing butyric acid (Pelouse . The bombardier beetle *Brachinus*, with its anal glands, ejects a jet of bluish vapor accompanied with a considerable explosion, which colors the human skin rust red; it is caustic, smells like nitrous acid and turns blue paper red. Westwood states that individuals of a large South American *Brachinus* on being seized "immediately began to play off their artillery, burning and staining the flesh to such a degree that only a few specimens could be captured with the native hand, leaving a mark which remained for a considerable time." The fluid ejected by another species in Tripoli, blackened the fingers of the collector. "It is neither alcaline nor acid, and it is soluble in water and in alcohol" (Kirby and Spence, IV, p. 149).

Species of other genera (*Agonum*, *Pheropsophus*, *Galerita*, *Helluo*, *Paussus*, *Ozæna*) are also bombardiers, though less decidedly so than *Brachinus*. A Paussid beetle (*Cerapterus*) ejects explosively a fluid containing free iodine (Loman), while *Staphylinus*, *Stenus*, *Ocypus olens*, *Lacon*, etc., have similar anal fœtid glands, the liquid being more or less corrosive. The secretion of *Mormolyce phyllodes* is so corrosive that it is said to paralyze the fingers for twenty-four hours after (Cuénot).

The two pairs of remarkably large soft eversible forked orange yellow glands of the European genus *Malachius*, are thrust out from the side of the first and the third thoracic segments. They are everted by blood-pressure, and retracted by muscles. The larva of *Hydrophilus piceus* ejects by the anus a black fœtid fluid.

Claus has shown that the larva of *Lina populi* and other Chrysomelidæ possess numerous minute eversible glands in each of the warts on the upper surface of the body, each gland containing a whitish repellant fluid smelling like the oil of bitter almonds and containing salicylic acid derived from its food plant, which issues as pearl-like drops.

Candèze thinks the fluid may contain prussic acid. The fluid is secreted by a variable number of glandular cells, each provided with an efferent duct. The larvæ of sawflies, notably *Cimbex americana*, also eject droplets of a clear fluid from their skin.

In this connection it may be mentioned that though there are no special glands present, many beetles emit drops of blood from the femoro-tibial joints of their legs as a means of defence. Such are the oil beetles (*Meloë*), *Cantharis*, *Lytta*. The cantharadine secreted by these beetles, according to Beauregard, is an efficient means of defense as birds, reptiles and carnivorous insects will not usually attack them. This substance is formed in the blood and also in the genital organs, and is so extremely caustic that scavenger insects which feed upon their dead bodies will leave untouched the parts containing cantharadine, and if May-beetles or Mole Crickets are washed with the blood of Meloë or with cantharidate of potassa, it will for several days render them safe from the attacks of the carabids which usually prey upon them. The eggs even after deposition are strongly vesicant, and are thus free from the attacks of egg-eating insects (Cuénot). The Coccinellidæ are also protected by a yellow mucilaginous disagreeable fluid oozing out of the sides of the thorax; in our common two-spotted Lady-bird (*C. bipunctata*) the yellow fluid is disagreeable, smelling like opium.*

The Dytiscidæ eject from the anus a colorless disagreeable fluid, while these beetles, and especially the Gyrinidæ, when captured send out a milky fluid which appears to issue from the joints of the body. The Silphidæ throw out both from the mouth and vent a fœtid liquid with an ammonial odor. They possess but a single anal gland, the reservoir opening on one side of the rectum (Dufour).

More agreeable secretions, but probably formed by similar glands, is the odor of rose or hyacinth given out by Cicindelæ, or the rose tailed larva of *Cerura* has been known to throw out a secretion, which was described by Bonnet in 1755 as a true acid, sharp, sour and biting. This spraying apparatus in *Cerura (Harpyia) vinula* has been well described by Klemensiewicz (Plate V, Fig. 4), though Rengger in 1817 noticed the general form of the secretory sac, and that it opens out in two muscular evertible tubes, out of which the secretion is ejected.

The fork-tailed larva of *Macrurocampa marthesia*, which is much like that of *Cerura*, when teased sends out a jet of spray to the distance of nearly an inch from each side of the neck. While examining the very gaily colored and heavily spined caterpillars of *Schizura concinna* I observed that when a fully grown one was roughly seized with the forceps or fingers it sent out a shower of spray from each side of the prothoracic segment, exactly like that of *Cerura* and *Macrurocampa*.

In the European *Cerura vinula* the apparatus consists of a single sac, which opens by a narrow transverse slit on the under side of the neck, out of which is rapidly everted four lateral tubes, two on each side (Plate V, Fig. 4 *t*), which are withdrawn within the opening by the contraction of several fine muscles. The apparatus in the American *C. multiscripta* is as in the European *C. vinula*. In a living specimen the large secretory sac was seen to be of the same size and shape as in *Macrurocampa*, and of the color of raw silk. The sac when disturbed extends back to a little behind the middle pair of legs, and is nearly two-thirds as wide as the body. The caterpillar sent out the fluid when handled, but I could not make it spray.

In the larva of *Macrurocampa marthesia* the cervical or secretory gland (Plate V, Fig. 5) is situated in the first and second thoracic segments, extending to the hinder edge of the latter and lying between the nervous cord and the œsophagus and proventriculus, and when empty the bulk of it lies a little to one side of the median line of the body. It is partly held in place by small tracheæ, one quite large branch being sent to it from near the prothoracic spiracle. The short large duct leading from it to the transverse opening in the membrane between the head and prothoracic segment is a little narrower than this opening, and is kept distended by tænidia or a series of short spiral threads which are pale, not honey-yellowish in color. This duct lies on one side of the prothoracic ganglion resting just under the commissures passing up to the brain; it is also situated between the two salivary ducts.

The very distensible sac (Plate V, Fig. 5) is rendered elastic by a curious arrangement of the cuticle, the tænidia of the duct itself being represented by very thickly scattered irregular separate, sinuous chitinous ridges which stand up from the cuticular lining of the wall of the sac (Plate V, Fig. 6). The secretory cells of the walls of this sac in *Cerura vinula* are said by Klemensiewicz to be large hexagonal cells, resembling those of silk glands, having like them large branched nuclei.

The fluid thrown out is said by Poulton to be formic acid; it causes violent effervescence when allowed to fall upon sodium-bicarbonate, and colors blue litmus paper red.

In the caterpillar of *Astyanax archippus* (*Limenitis disippus*) a dark bladder-like sac is everted, but the lateral tubes appear to be wanting and no spray is sent out; it occurs in the larvæ of many Nymphalidæ, and other butterflies and moths.

Scudder tells me that these glands are generally present in the larvæ of butterflies, including the present species, but as I observed it repeatedly and with some care in this caterpillar I will record my observations. A larva which had hibernated was found May 11 at Providence on a leaf of the wild cherry; its length was 12 mm. I could not but be struck with the protective resembance of the creature when curled up to a mass of birds' droppings.

While examining the caterpillar, my attention was called to a whitish mass with a black outer edge, situated on the under side of the prothoracic segment just behind the head, and in front of the first pair of legs. On removing this mass with the needle I found under it a large low conical eversible soft tubercle covered with short hairs. On rupturing the gland with a needle a little fluid exuded from it. When at rest the gland is retracted within a transverse oval opening. No odor appears to be given out by the fluid, as tested by four persons.

The caterpillar when at rest was experimented on, with the following result. On rudely touching it with the point of a needle, it turned

While describing the living larva of *Perophora melsheimerii* my attention was called to some small singular sternal tubercles on the two hinder thoracic segments; but I did not, to my regret, then carefully examine them. On farther examination of two alcoholic specimens, however, I find that the tubercles guard the lips of an eversible gland. They are most distinct on the third thoracic segment, where there are to be readily found four dark prominent papillæ, two on each side of the median line of the body, directly behind the base of the legs. The heads of the papillæ are dark and finely granulated. The two tubercles on each side touch each other; they are probably modified piliferous warts. These four papillæ enclose a square area in the middle of which are the lips, arranged transversely, of the mouth of an eversible gland. These organs are also present on the second segment, and are of the same degree of development. Whether there is the opening of a functional sternal eversible gland on the first thoracic segment I am uncertain, as I have been unable in my two alcoholic specimens (one of which had died and shrivelled up) to detect any traces of lips. On this segment the base of the legs are close together, the basal joints being large and closely contiguous. There are no tubercles developed like those on the second and third segments, and in the material at my disposal I have been unable to find an opening. It is not improbable, however, that such a gland with lips once existed in the ancestors of this and of *Lacosoma*, for in *Nola*, which is a member of a family probably much later in appearance, there are two well developed sternal glands. In several Notodontians one is well developed on the under side of the first thoracic segment, while there are none behind. Probably in the Perophorinæ, owing to the modifications of the body, due perhaps to their constructing a case and thus causing some change in the movements of the first pair of legs, they are much nearer together than usual in larvæ not thus adapted to living in cases.

In *Lacosoma* homologous papillæ are present in the corresponding segments, but whether the external opening of the gland is present I am unable as yet to state. On the third thoracic segment there are four tubercles present in the same general position as in Perophora. The anterior pair, however, are very small, and (antero-posteriorly) remote from the hinder pair. The latter are much larger than the front pair and in the form of small, rather slender papilliform tubercles, and armed at the end with several crowded spine-like granulations. Between them is to be seen in my single alcoholic specimen a depression, but I cannot detect any lips or any opening. On the second thoracic segment is only a single pair of papillæ; the anterior pair being obsolete, and I cannot detect any opening to a gland.

On the first thoracic segment, the legs are closely contiguous at their broad expanded bases. Directly behind the legs and in the median line of the body is a minute area bearing two minute tubercles, but no opening near them is visible.

It is possible, though careful observations on the living larvæ are needed, that the openings of the repugnatorial glands in Lacosoma are closed from disuse, and that the glands themselves only exist in a rudimentary state. It is interesting, however, to find these glands in this family, and to find that they appear obsolete (at least the external openings in *Lacosoma*), while the glands are functionally active in *Perophora*, a genus so nearly allied. It will be interesting to ascertain whether these glands are present in the true sackworms, or Psychidæ. We should hardly, however, expect to find them developed, since these caterpillars are in closer quarters, the sacks being smaller and more tubular, and there seems to be little need of active repugnatorial glands in creatures otherwise so well protected from attack.*

The caterpillars of the swallow-tailed butterflies (*Papilio*, *Doritis* and *Thais*), as is well known when irritated thrust out from a transverse slit on the upper part of the prothoracic segment, a large orange-yellow V-shaped fleshy tubular process (the *osmeterium*), from which is diffused a more or less melon-like but disagreeable, in some cases, an insufferable, odor; the secretion is acid and reddens litmus paper. The mechanism has been described and figured by Klemensiewicz.

When at rest or retracted the osmeterium lies in the upper part of the body in the three thoracic segments, and are crossed obliquely by sev-

(*Danima banksii* Lewin) protrudes from the under side of the prothoracic segment a y-shaped red organ like that of *Papilio*; no fluid or odor is given out.

The showy caterpillars of *Orgyia* and its allies have a conspicuous coral-red tubercle on the back of the sixth and also the seventh abdominal segment, which on irritation are elongated, the end of the tubercles being eversible. When at rest the summit is crateriform, but on eversion the end becomes rounded and conical. These osmeteria are everted by blood pressure, and retracted by a muscle. Plate V, Fig. 9 represents a section of an osmeterium of *Orgyia leucostigma* when retracted by the muscle (*m*); at the bottom of the crater are the secreting or glandular cells (*gc*), being modified hypodermal cells. These doubtless serve as terrifying organs to ichneumons and other insect enemies, and though we have been unable to detect any odor emanating from the tubercles, yet doubtless they give out a scent perceived by and disagreeable to their insect assailants.

In the Hemileucidæ there are two pairs of lateral osmeteria, which, however, are not highly colored (Pl. V, Fig. 10). In *Megalopyge* (*Lagoa*) there is a lateral row of singular pale permanently everted processes which appear to be the homologues of the osmeteria of larvæ of other lepidopterous families.

In the caterpillars of certain blue butterflies (Lycænidæ) is an internal osmeterium, being a very minute sac which is everted from a transverse slit on the top of the seventh abdominal segment. Its function is quite the opposite of those of the caterpillars of other families since the sac exudes a sweet fluid very attractive to ants, which may be diffused more widely by the delicate spinulose bristles crowning the summit. W. H. Edwards states that in several species of Lycæna, besides that on the seventh abdominal segment, there is on the eighth segment a pair of minute dorsal evaginable tubercles.

In certain of the butterflies, the *Heliconidæ* (*Colænis*, *Heliconius*, *Euides* and *Dione*), there is thrust from the end of the abdomen a pair of large irregular rounded evertible glands, which give out a disagreeable odor, and are consequently repellant, and which seem to be the homologues of the odoriferous glands of other butterflies.

The large soft rounded evertible glands, looking like puff-balls or a rounded pudding (Pl. V, Fig. 12) are everted, when the butterflies are roughly seized, from the dorsal side of the penultimate segment of the abdomen. The males possess two smaller tubercles on the inside of the anal claspers or lobes. Müller also detected, in the females of various species of the Heliconidæ enumerated above, a pair of club-shaped processes like the balancers of flies, which are thrust out on each side of and under the odoriferous puff-balls of the hinder edge of the penultimate segment (Pl. V, Fig. 13). The club or head is armed with hairs or bristles, which in *Heliconius* are like the scales of a butterfly.

A pair of small ramose odoriferous glands are said by Siebold, who regarded them as alluring glands, to occur in *Argynnis*, *Melitæa* and *Zygæna*, to be situated near the orifice of the oviduct, and Scudder has detected them near the anus of the female pupa of *Danais archippus*. The appearance of the odoriferous glands in the pupa of *Vanessa io* is well shown by Jackson (Pl. V, Fig. 14). They develop as two tubular ingrowths of the hypodermis, perfectly distinct one from the other, each having its own separate aperture to the exterior. In Fig. 14 the condition of parts is nearly as in the imago, the glands being situated below the rectum and opening of the oviduct. In both sexes of another Brazilian butterfly (*Didonis biblis*) on the median line of the abdomen between the fourth and fifth segments are two roundish vesicles covered with short gray hairs, which emit a disagreeable smell.

It is possible that the dark green fluid in *Parnassius*, secreted by an evaginable gland and which is moulded into shape by the scimetar-shaped *peraplast* (Scudder), is formed by the homologues of the anal glands of other butterflies.

Distribution of repugnatorial or alluring scent Glands in Insects.*

* The names of the discoverers of the glands are enclosed in parenthesis.

A. LARVAL INSECTS.

Family NOCTUIDÆ.

Bryophila (*Rogenhofer*).
Cucullia formosa (*Rogenhofer.*)
Cucullia scrophulariæ (*Rogenhofer*).
Habrostola (*Rogenhofer*).
Cleophana lineariæ (*Rogenhofer*).
Catocala, sp. (*Poulton*).
Aporia cratægæ (*Goossens*).
Aplecta nebulosa (*Goossens*).
Leucania staminea (*Goossens*).
Leucania hispanica (*Goossens*).
Leucania nonagrioides (*Goossens*).
Plusia gamma (*Schaeffer*).

Family NOTODONTIDÆ.

Pheosia rimosa (*Packard*).
Schizura concinna (*Packard*).
Danima Banksii (*Ash*). (Australia, Ent. Month. Mag., Sept. 1892).
Macrurocampa marthesia (*Packard*).
Heterocampa pulverea (sends out vapor from neck, *Riley*, in conversation).
Cerura vinula Goedart (*Schaeffer*).
Cerura furcula (*Poulton*).
Cerura borealis (*Packard*).
Cerura multiscripta (*Packard*).

Superfamily RHOPALOCERA.

Family NYMPHALIDÆ.

Limenitis disippus (*Scudder*).
Astyanax archippus (*Scudder, Packard*).
Argynnis cybele (*Scudder*).
Vanessa io (*Klemensiewitz*).
Melitæa artemis (*Walsingham*).
Melitæa sp. (*Rogenhofer*).
Vanessa sp. (*Rogenhofer*).
Argynnis sp. (*Goossens*).
"Larvæ of many Satyrids." (*Goossens*).

c. Prothoracic, dorsal; sending out a v-shaped odoriferous organ (Osmeterium).

Family PAPILIONIDÆ—all the species, as a rule.

d. Thoracic sternal, evaginable glands.

Family PEROPHORIDÆ.

Lacosoma chirodota (*Packard*).
Perophora melsheimerii (*Packard*).

Family NOLIDÆ.

Nola strigula (*Goossens*).
Nola ovilla (*Packard*).
Nola cucullatella (*Chrétien, Packard*).

Order HYMENOPTERA.

Family TENTHREDINIDÆ.

Crœsus septentrionalis (*Poulton*). **Cimbex americana** (*Packard*).
Crœsus varus (*Poulton*).

e. Lateral abdominal partly eversible glands emitting neither moisture nor odor, but flesh-colored.

Superfamily TINEINA.

Phyllocnistis ? (*Chambers*). Eight pairs.

Family HEMILEUCIDÆ.

Hyperchiria io (*Dimmock, Packard*). Two pairs, viz., on 1st and 7th segment.
Hyperchiria ? sp. Mexico. (*Packard*).
Hemileuca yavapai (*Packard*).
Hemileuca maia (*Packard*).
Pseudohazis eglanterina (*Packard*).

f. Lateral abdominal ~~permanently everted glands~~, not known to secrete a fluid, nor to be odoriferous.

Family LAGOIDÆ.

Lagoa crispata (*Packard*).

Parorgyia leucophæa (*Riley*).
Parorgyia paralella (*Packard*).
Dasychira pudibunda (*Poulton, Packard*).
Liparis detrita (*Klemensiewicz*).
Liparis auriflua (*Klemensiewicz, Packard.*)
Liparis rubea (*Klemensiewicz*).

All Liparidæ except *Demas* (*Poulton*).

In the following Indian species they have been observed by Mr. Poulton:

Lymantria concolor.
Chœrotricha plana.
Charmidas exclamationis.
Artaxa vitellina.
Artaxa scintillaris.
Artaxa guttata.
Dasychira dalbergiæ.

h. A single median abdominal dorsal gland emitting a fluid attractive to ants, on seventh segment; with a pair of minute index glands on the eighth segment.

Family LYCÆNIDÆ.

Lycæna damon (*Pezold*).
Lycæna bætica (*Guenée*).
Lycæna pseudargiolus (*Edwards*).
Lycæna icarus (*Edwards*).
Lycæna scudderi (*Saunders*).

i. Protrusile organs near the anus.

Myrmeleon larva (*Hagen ? Dimmock*).

B. NYMPH OF AMETABOLOUS INSECTS.

a. Paired dorsal glands on abdominal segments 1, 2 and 3.

Cimex lectularius (*Künckel*).

b. The same on abdominal segment 5.

Lachnus strobi (*Gissler*).

C. PUPA OF CERTAIN BOMBYCES.

At anterior end of certain pupæ, internal glands to moisten threads of the cocoon for exit of moth.

D. ADULT INSECTS.

a. Occurring on the prothorax only; strongly repugnatorial, best developed in ♂ .

Anisomorpha buprestoides (*Peale, Say, Boll, Scudder*).
Autolyca pallidicornis (*Stål, Scudder*).
Phasma putidum (*Bates*).
Phyllium, sp. (*Scudder*).
Heteropteryx, sp. (*Scudder*).

Diapheromera femoratum (*Scudder*).

Probably in all the species of the family (*Scudder*).

Mantis carolina (*Packard*).

b. Occurring on the pro- and mesothorax, and on the middle of the abdomen orange-yellow fleshy tubercles or evaginations.

Malachius bipustulatus (*Laboulbène, Klemensiewicz*).

Anthocomus equestris *Laboulbène.*

Evæus thoracicus (*Laboulbène*).

c. Segmental eversible glands homologues of the coxal glands of other Arthropods, occurring on all or nearly all the abdominal segments.

Scolopendrella immaculata, coxal glands on third to eleventh and last pair of legs (*Latzel, Haase*).

Campodea staphylinus, a pair of coxal glands on first to eighth abdominal segments.

Campodea cookei (*Packard*).

Campodea mexicana (*Packard*).

Machilis maritima, evertible coxal glands on segments 1–7 (*Oudemans*).

d. Occurring on the under side of the abdomen.

d^1. *In the two first abdominal segments.*

Corydia carunculigera ♂ and ♀ (*Gerstaecker*).

d^2. *Alluring organs situated on the dorsal side of the abdomen, in the sixth, or sixth and seventh, abdominal segment.*

Periplaneta americana ♂ (*Minchin*).

Periplaneta orientalis (*Minchin*

Ectobia lapponica ♂ (*Minchin*).

Phyllodromia ♂ only (*Minchin*) Haase.

EXPLANATION OF PLATE V.

Fig. 1. Anal eversible glands of *Eleodes*. (After Gissler.)

Fig. 2. Anal eversible glands of *Blaps*. (After Gilson.)

Fig. 3. Anal glands (*agl*) of *Carabus hortensis*; *rs*, reservoir; *d*, excretory duct; *i*, intestine; *r*, rectum. (After Kolbe.)

Fig. 4. Prothoracic spraying apparatus of *Cerura vinula*; *gl*, the gland; *d*, its duct, with tænidia; *t*, the spraying tubes; *m*, muscles; *rm*, retractor muscles. (After Kliemensiewicz.)

Fig. 5. The thoracic glandular sac of *Macrurocampa marthesia; gl*, the glandular sac; *d*, its duct; *e*, peritracheal epithelium; *t*, the spiral threads or tænidia.

Fig. 6. Irregular separate masses of chitinous ridges on the cuticular lining of the wall of the sacs of *Macrurocampa marthesia*.

Fig. 7. Osmeterium (*os*) of the larva of *Papilio machaon* at rest; *rm*, the retractor muscles at the ends; *m*, the numerous oblique muscles; *dm*, dorsal longitudinal muscles; *t*, trachea; *oe*, œsophagus; *gang*, brain; 1, head; 2, 3, 4, thoracic segments.

Fig. 8. Osmeterium (*os*) of one side, enlarged; *g*, glandular portion at the base; *d*, depressions in the cuticula of the glandular portion; *t*, trachea. (This and Fig. 7 after Kliemensiewicz.)

Fig. 9. Eversible dorsal glands (*ev. gl*) of larva of *Orgyia leucostigma* in Stage II; *gc*, glandular cells at bottom of the crater-like depression; *m*, retractor muscle; *p*, poison gland-cells of the root of the seta (*s*); *c*, cuticula; *hyp*, hypodermis; *A*, portion of the cuticle and hypodermis enlarged.

Fig. 10. Lateral eversible gland of *Hyperchiria io*, Stage II; *rm*, retractor muscle; *oen*, œnocytes.

Fig. 11. The same as Fig. 10, but representing a section through one side of the eversible gland.

Fig. 12. *A*, end of body of *Colænis julia; ev*, eversible anal gland; *oa*, odoriferous appendages; *B*, the same in *Heliconius apseudes*, side view; *C*, odoriferous appendages of *Colænis dido* in fresh condition; *D*, tested with alcohol and benzine.

Fig. 13. Odoriferous appendages of *Heliconius eucrate*, head cleansed—(Figs. 12–13 after F. Müller.)

Fig. 14. Odoriferous glands (*ogl*) in the pupa of *Vanessa io*; *r*, rectum; *h*, the folds of hypodermis which forms the terminal papilla of the abdomen; *ov*, oviduct. (After Jackson.)

SOME ACARIANS FROM A SPHAGNUM SWAMP.

By NATHAN BANKS.

Near the village of Roslyn, L. I., N. Y., there is, on a hill about one hundred feet high, a deep swamp, locally known as "The Black Swamp." Sphagnum grows abundantly in the swamp, and in some places it is covered with water for a considerable portion of the year. It was from the sphagnum which was covered with a few inches of water that the following mites were taken. None of the forms exhibit any peculiar structure fitting them for their semi-aquatic life. One of the Oribatids has very long setæ, and another species, which I have also found elsewhere, has slightly longer setæ than when in drier situations.

GAMASIDÆ.

Lælaps placidus, sp. nov.

Length .65 mm. Reddish yellow, legs and venter more yellowish Body oval, narrower in front, broadly rounded behind; dorsal shield smooth undivided, covering entire dorsum, with a few very short and fine hairs, especially behind; epistoma longer than broad, rounded at tip, with a faint median spine and minute denticulations each side; the mandibles moderate, the superior branch bearing a sharp tooth or spine near its tip beneath and one or two short basal hairs, the finger or movable branch much more slender than the superior branch. The scuta which bears the peritreme on its lower margin gradually broadens in front, the circular spot of peritreme opposite the space between third and fourth coxæ. The legs about equally stout, the first pair a little longer than the fourth, and not quite as long as the body; all provided with short stiff bristles, and terminate in a prominent sucker, as well developed on the first pair as on the rest; anterior coxæ separated by the bases of the mandible and palpi; the latter one-half as large as the legs and two-thirds as long as the body. Ventral shield divided at the third coxæ; not covering the whole of the venter, but leaving a quite broad, membraneous, white opening; coxal plate with two transverse lines; legs very short, anterior tibia barely longer than the patella, posterior femora very broad and margined below, a curved plate just behind the anterior coxæ; legs most hairy at tips. Differs from *O. arborea*, to which it is allied, by the shape of the wings, in having no superior bristles, the longer setæ, small tectal plate, shorter legs, and broad, margined hind femora.

Many specimens from wet sphagnum, near Roslyn, N. Y.

Oribata emarginata *Bks.*

Several specimens of this species were shaken from the sphagnum; the setæ are a little longer than in typical specimens.

Oribatella setosa, sp. nov.

Length .48 mm. Red-brown, legs paler, a pale spot at base of abdomen. Body longer than broad, only moderately high; tectal plate short, the anterior corners free and projecting spine-like, each with a bristle at tip; superior bristles extremely long, erect and prominent, nearly as long as the anterior legs; setæ nearly two-thirds as long as the superior bristles, weakly clavate. Abdomen smooth, broad, evenly convex; wings quite large, somewhat triangular, the tip broadly rounded, posterior margin very oblique, anterior faintly concave, distinctly longer than deep, hyaline; venter finely granulate; genital opening small, about its length in front of the larger anal opening; coxæ with the outlines distinct; legs short, hairy as usual.

I place this species in *Oribatella* as the extreme tip of the tectal plate is free and each corner prolonged into a spine; but the tectal plate is more united to the cephalothorax than in the other species of the genus; still in Oribata it is wholly united and the corners never extend into spines. It is readily recognized by its long bristles and setæ.

Many specimens shaken from wet sphagnum; Roslyn, N. Y.

Carabodes granulatus, sp. nov.

Length .4 mm. Black. Cephalothorax granulate, broad, tapering to the truncate front, where there are a few simple hairs, a plate-like elevated ridge each side, a median pair of short clavate hairs; setæ a little longer than the hairs and capitate. Abdomen roughly granulate, distinctly longer than broad, sides nearly parallel, base truncate, tip broadly rounded, with four short capitate hairs on each posterior side and four rows above, the submedian with four and the lateral with three hairs; venter granulate like dorsum; genital opening about once and a-half its length in front of the slightly larger anal opening; coxæ separate, legs short, femora thickened.

Related to *C. oblonga* and to a new species by having the ventral apertures widely separate, and with them should probably form a new genus. It differs from *C. oblonga* in the shorter body, more coarsely granulate abdomen, and in the clavate hairs. Two specimens shaken from wet sphagnum; Roslyn, N. Y.

Nothrus simplex, sp. nov.

Length .9 mm. Pale yellow-brown. Cephalothorax quite flat, triangular, concave in the middle sides, rounded in front, and with a pair of bristles; superior bristles quite long; setæ moderate, clavate. Abdomen much depressed, smooth above, with irregular, shallow depressions, truncate at base, gradually growing broader, broadly rounded behind; two simple bristles on margin, one near middle, and one towards the tip; margin very acute. Venter finely granulate, showing a narrow triangular area which encloses the connate ventral apertures; the genital one being a little broader than long and slightly narrower behind; the anal one slightly longer than the genital, nearly twice as long as broad, and much broader at base than at tip; legs short, the joints thick, with parallel sides, slightly roughened, and with short simple bristles, the coxæ separate.

Readily distinguished by its depressed and simple body, the rounded tip and the few simple bristles. The young are of an obovate form and have a corrugated epidermis; *i. e.*, folded into curved ridges. A few specimens shaken from wet sphagnum, Roslyn. N. Y.

◆

LARVA OF DEMAS PROPINQUILINEA; ITS SYSTEMATIC POSITION.

By HARRISON G. DYAR, Ph. D.

Prof. E. B. Poulton has shown that dorsal eversible glands are of general occurrence throughout the larvæ of the Lymantriidæ (Trans. Ent. Soc., London, 1887, p. 300) on the tenth and eleventh joints, or rarely only on the eleventh joint (*Dasychira pudibunda*). Probably these structures are characteristic of the family, but Prof. Poulton did other family. In fact, it appears to me that the placing of *Demas* among the Lymantriidæ may properly be characterized as premature.

The larva of our one species (*D. propinquilinea*) has been described by Goodell and Thaxter. Mr. Goodell describes the usual form, but his description of the red hair-tufts I cannot exactly reconcile and he does not mention the anterior pair. Dr. Thaxter notes a variety in which the tufts are black instead of red. I subjoin my own notes. Two points of interest may be noted about this larva. (1) It greatly resembles in general appearance *Halisidota harrisii*, and like it is fond of hiding during the day. (2) It possesses a curious coloration which may serve to suggest to its insect enemies that is already occupied by a parasite. This consists of a series of oblique black shades adjoining the white spiracles; the elliptical white spiracle greatly resembles the egg of Tachina, while the dark shade represents the path of the emerged parasite. The appearance is very natural.

Larva.—Head white shining, covered with angular light red blotches which obscure the ground color above apex of clypeus, except in narrow irregular lines; jaws black; bases of antennæ and labrum pale; width about 4 mm. Body grayish white with wrinkled irregular transverse lines. Spiracles white, each surrounded and preceded by an oblique black patch. Warts large, iv absent, on joints 3 and 4 two warts above the stigmatal wart and one below it; hair rather bristly, not long nor obscuring the body, but quite abundant, white; from tubercle ii on joint 3 a light red pencil; from the upper half of tubercle i on joints 5 and 12 a red tuft, the component parts approximating and forming a single dorsal tuft. No secondary hairs, but a few long ones from the extremities. Warts white. A faint dorsal and lateral dusky stripe, not formed of pigment, but more transparent than the other parts of the skin. Warts i and ii on joint 12 form a trapezoid.

Found on maple in a house of two leaves united by silk. Imago in May.

Pupa shining dark brown with a large wrinkled cremaster and three movable incisures. Of the usual Noctuid appearance (quite unlike *Orgyia*) and passing the winter.

NOTE ON THE SMERINTHINÆ.

By A. RADCLIFFE GROTE, A. M.

Having recently enjoyed the opportunity of studying the three or four common European species usually referred to *Smerinthus*, I find they belong to distinct genera. *C. ocellatus* has a blunt spine at extremity of fore tibiæ, and in cut of wing agrees well with *Copismerinthus ophthalmicus*, as pointed out by me twenty years ago. I would therefore refer *C. ocellatus*, *C. cerisii* and *C. ophthalmicus* to *Copismerinthus* Grote, 1886. I have formerly assumed that *ocellatus* was the type of Latreille's genus, but incorrectly so; since Latreille considers *populi* the type. Thus *Amorpha* Hübn. Tent., proposed for *populi* alone, is a synonym of *Smerinthus*. To *Eusmerinthus* Grt., 1886, belongs *E. geminatus* as type, which has the fore tibiæ unarmed. *Paonias* Hübn., 1818, I have restricted originally to our *P. excæcatus*, and it is now generally used for this type. The genus as it stands in the Verzeichniss is a mixed genus, but it seems to have been entirely neglected by Europeon writers until I restricted its use to *P. excæcatus*. Our eyed Smerinthi remaining belong to *Calasymbolus* Grote, with *astylus* as type. Butler's extension of my generic term cannot be followed.

For *tiliæ*, the term *Mimas*, Hübn. Verz. must be kept, since this is the sole species and therefore type. To this genus the European *Polyptychus quercus* is allied in the shape of the wings, There is a sulcation on primaries opposite the cell and the secondaries have a shallow excavation from vein 4 to anal angle. In *Smerinthus populi*, *Polyptychus quercus* and *Mimas tiliæ*, the fore tibiæ are unarmed. The differences in the structure of the frenulum is described by Mr.

Eusmerinthus *Grote*, 1886.

Type: E. GEMINATUS.

4. **geminatus** *Say*.* Lower Canada to Middle States.
   var. **jamaicensis** *Fernald*.
   var. **tripartitus** *Grt.*

Calasymbolus *Grote*, 1874.

Type: C. ASTYLUS.

5. **astylus** *Drury*. Southern New England; Middle States.
   integerrima HARRIS.
6. **myops** *Ab. & Sm.* Canada to Southern States.

Paonias *Hübn.*, 1881.

Type: P. EXCÆCATUS *A. & S.* (Grote restr.).

7. **excæcatus** *Ab. & Sm.* Canada to Southern States.

Mimas *Hübn.*, 1818.

Type: M. tiliæ.

8. **tiliæ** *Linn.* Europe.

Polyptychus *Hübn.*, 1818.

Type: P. QUERCUS (Grote restr.).

9. **quercus** *Schiff.* Southern Europe.

Smerinthus *Latr.*, 1805 — AMORPHA *Hübn.*, 1806.

Type: S. POPULI.

10. **populi** *Linn.* Europe.

Triptogon *Bremer*.

11. **modesta** *Harris*. Canada; U. S. east of Rocky Mts.
    var. **occidentalis** *Hy. Edw.*

Cressonia *G. & R.* 1865.

Type: C. JUGLANDIS.

12. **juglandis** *Ab. & Sm.* Canada to Southern States; Mexico.

---

* If *jamaicensis* Drury is our species with a wrong locality, the name has priority, but from the uncertainty I do not propose it. I have not found any *Smerinthus* in any West Indian collection hitherto examined by me. I have not been able to examine any of the Asiatic species.

ON THE CORRELATION OF HABIT IN NEMO~~S~~CEROUS AND BRACHYCEROUS DIPTERA BETWEEN AQUATIC LARVÆ AND BLOOD-SUCKING ADULT FEMALES.

By C. H. TYLER TOWNSEND.

It is a rather striking fact that in most of the dipterous families whose adult females are of mammalian blood-sucking habit, the larvæ are commonly aquatic. Such larvæ breathe in various ways, but often by means of tracheal gills or vesicles. Especially is this correlation of habit evident in the older families of diptera, the Nemocera and those more nearly allied to them. It seems strange that such an apparent connection in habits in these families should have escaped the notice of previous observers, yet no one seems to have ever remarked upon it.

The following families possess such blood-sucking females. The known blood-sucking genera are starred, while all the other genera given possess mouth-parts capable of biting, though they are not so far known to suck blood.

Orthorhapha Nemocera.

- **Simulidæ:** Single genus *Simulium*.*
- **Culicidæ:** *Megarrhina*,* *Culex*,* *Anopheles*,* *Aëdes*, *Corethra*, *Mochlonyx* (European).
- **Chironomidæ:** *Ceratopogen** (some spp.), *Terrestes*,* *Oecacta*,* *Chironomus*, *Tanypus*, *Diamesa*, *Chasmatonotus*, *Hydrobænus*, *Heteromyia*, *Coryneura* (Eu.). In fact all the known genera except *Clunio* (Eu.) have biting mouth parts.

comparatively recent acquirement in the female sex. They suck not only mammalian blood (horses, sheep and bats), but also that of birds.

The larval habits of the genera above named, so far as known, are as follows:

Simulium: Larvæ live in water, usually swift running water.
Megarrhina: In water.
Culex: In water.
Anopheles: In water.
Aëdes: Unknown.
Corethra: In water.
Mochlonyx: In water.
Ceratopogon: Some species live in water, others in foul vegetable matter.
Terresthes: Unknown.
Oecacta: Unknown.
Chironomus: Some species in water, others in earth and dung.
Tanypus: In water.
Diamesa: Unknown.
Chasmatonotus: Unknown.
Hydrobænus: In slimy mud.
Hetèromyia: Unknown.
Corynoneura: Unknown.
Phlebotomus: Probably aquatic, as some Psychodid larvæ live in water.
Tabanidæ: The larvæ of *Tabanus* live in water or in moist earth, and those of *Chrysops* probably in slimy mud and water. The larval habits of other genera are not known, but are doubtless the same.
Symphoromyia: Unknown.
Leptis: Moist earth.
Atherix: In water.
Stomoxys: In horse dung.
Hæmatobia: In cow dung.
Glossina: Unknown.

The mode of larval respiration in the strictly acquatic forms, so far as known, is as follows: *Simulium* larvæ breathe by means of a tracheal network in the skin, also by tracheal vesicles at the anal extremity.

Chironomus, *Tanypus*, and the aquatic larvæ of *Ceratopogon* have a closed tracheal system, rudimentary and completely closed in *Chironomus*. In *Corethra* it is also rudimentary, and perhaps supplemented by respiration through the skin.

Culex, *Anopheles* and *Mochlonyx* have a pair of longitudinal tracheæ, ending in anal spiracles, through which they inhale air. They also, together with most Chironomidæ are provided with various branchial appendages.

Some Psychodid larvæ possess branchiæ of various shapes. Further notes of interest in this connection are the following: The European genus *Clunio* Haliday is the only known Chironomid genus in which the proboscis is rudimentary and almost entirely wanting.

The larvæ of Blepharoceridæ live in swift running water like those of *Simulium*, or in still swifter water. The mouth parts of the adults seem to be capable of biting.

Rhyphus, and some Bibionidæ, have biting mouth parts.

Going now to the Brachycera, we find that *Leptis* and *Atherix*, probably also other Leptidæ, posses biting mouth parts capable of sucking blood, but *Symphoromyia* is the only Leptid genus which has so far been recorded to practice this habit. I have observed its blood-sucking habit on San Francisco Mt., in Arizona.

Thereva has biting mouth parts much like a Tabanid. Its larvæ live in slimy mud or moist earth. Other Therevidæ have similar mouth parts, but no species are known to suck mammalian blood. The larvæ in general are said to live in fungi and decaying wood, and the adults to prey on other insects.

In this connection it will be well also to mention the mouth parts of the Asilidæ, which are fitted for piercing and sucking, but which are very different from those of the Tabanidæ. They are specially fitted for piercing the exoskeleton of insects, and differ strongly from the mouth parts of genera which pierce the skin of mammals.

To sum up, we have the following genera which are known to have aquatic larvæ and blood-sucking adult females:* *Simulium*, *Megarrhina*, *Culex*, *Anopheles*, *Ceratopogon*, *Phlebotomus* (probably), and many Tabanidæ genera. This list will doubtless in time be increased, as we have blood-sucking genera, of which the larval habits are unknown; and genera whose larvæ are known to live in water, but whose adults, while possessing mouth parts capable of biting, have never been observed to suck blood.

On the whole the rule seems to hold good in the Nemocera, nearly

DESCRIPTIONS OF THE PREPARATORY STAGES OF ENNOMOS ALNIARIA (*Linn.*).

By WM. BEUTENMÜLLER.

Egg.—Oblong, flattened above and below, shining, smooth, olive brown with a large white spot on the side which is truncate and where the young larva escapes; at the other end it is slightly rounded; sides almost parallel. Length 1 mm.; width .5 mm. Laid October 6, 1892, in chain-like rows, one egg against the other; emerged April 7, 1893.

Young Larva.—Length 3 mm. Head testaceous, body above dull green; below the spiracles and under side yellowish, translucent; as the larva grows older it is wholly pale green. Length 8 mm. Moulted April 29th.

After first moult.—Entirely pale green, without any visible markings whatever, smooth and somewhat shining. Length 13 mm. Moulted May 6th.

After second moult.—Green as in the previous stage; apparently no change, except that the junctions of the segments are yellow. Length 16 mm. Moulted May 15th.

After third moult.—Not much different from the last stage. The body beneath is quite flattened and the lateral edge is ridged beneath the spiracles. The head is also much flattened and projects forward. Length 22 mm. Moulted May 24th.

After fourth moult. Green; thoracic feet brownish, antennæ rather long, pinkish; beyond the middle of the fifth segment is a transverse fold or ridge, which is brown in some individuals and on the eighth and eleventh are two small tubercles, the summits of which in some individuals are brown. On each segment along the dorsum are two minute piliferous spots, which are hardly visible without a lens. On the eleventh and twelfth segments are a few short yellowish hairs. The pair of abdominal legs on the ninth segment brown outside (no other abdominal legs present). Anal legs pinkish at extremities. Beneath, there is a pair of tubercles on the sixth segment. The minute tubercles are also present. Length 27 mm. Moulted June 4th.

After fifth moult.—The fifth segment above is now much more swollen into a transverse ridge and a corresponding one on the sixth segment beneath, but which is not quite so prominent. The two first pair of thoracic feet project forward and are pressed to the body, while the last pair rest on the twig. On the eighth segment is also a transverse swollen ridge. The tenth to twelfth segments inclusive are dull green, mottled with brown spots, and on the dorsum of the eleventh segment are two brown spots. The body is bright green, with the junctions of the segments yellow. Length 65 mm. Moulted June 15th.

Fully-grown Larva.—The body is now dull dirty green instead of bright green, and mottled with greenish ochreous. The head is comparatively small, and the first segment is about equal the width, the remaining segments gradually increasing in size. The thoracic feet have the bases considerably swollen and ringed with ochraceous. The pair of abdominal and anal legs are chocolate brown. Over the body are scattered irregularly small, elevated, pale yellowish spots, especially on the last three segments, which are conspicuously mottled. The cervical shield is dirty chocolate brown; on the second to tenth segments inclusive, are four minute black tuberculate spots; the fourth and fifth segments have an additional pair of spots. The transverse ridge on the fifth is very prominent, as is also the one on the underside of the sixth segment and the one on the eighth segment, and the two black tuberculate spots on the dorsum of the eleventh segment. Underside of body same as above, except the last three segments pale whitish-green. Anal plates tinged with lilac. Length 110 mm.

When fully fed the larva spins a loose thin double cocoon between leaves. The cocoon is an ovate elongated whitish web, and is open on each end. The pupa is pinkish white, roughened on all the segments, but the spaces between are semitransparent and yellowish. The pupa is also covered with a mealy substance. Length, 35 mm.; cocoon, 40 mm.

Food-Plants: Elm, Maple, Sweet gum, etc.

a little over a week on "hard-tack," they were transferred to fresh leaves of Rhododendron, which was then beginning to bud. This food they ate with great relish, and the change was very striking. They began to grow rapidly and became very active. After passing two more moults they finally spun their cocoons, from which emerged, about one week later a perfect male moth. The other pupa did not hatch. It was at one time supposed that *H. lilith* was a valid species. I have carefully compared the larva with that of the type form, *H. io*, but could not detect the slightest difference, either in shape, coloration or markings. Mrs. Slosson, however, informs me that the young larva of *lilith* is much paler in color than that of *io*.

◆

THE EARTHWORM AS A TREE-PLANTER.

By F. M. WEBSTER.

The habit of drawing the leaves and stems of various plants into their burrows has been frequently noticed of these worms, and Darwin, in his classic work, has cited many instances of this character. I have more than once surprised them tugging at a leaf of grass that was attached to the stem, the latter sometimes being bent to the ground by their exertions. This spring a small patch of sward had been spaded up with a view of planting flowers thereon, but the ground lay for sometime untouched, and was observed to be quite thickly populated by earthworms, and the openings of their vertical homes were very numerous after a rain had fallen and formed a slight crust over the surface of the ground. About this time a maple tree close by began dropping its seeds and quite a number fell on the still undisturbed flower bed. In a short time many of these seeds assumed a vertical position, while in other places a number would be grouped together, obliquely, forming a sort of rosette. A little patience and careful watching showed that the maple seeds had been drawn into the homes of these creatures, and, as many of the seeds afterwards germinated and grew, if left undisturbed, they might have made a small forest, the planters thereof having worked without hands, and with little knowledge of their influence upon the vegetable that they had only attempted to secure as a morsel of food.

LOCAL ENTOMOLOGICAL NOTES.

Members of the New York Entomological Society and all others are solicited to contribute to this column, their rare captures, local lists and other items of interest relating to the insect fauna of New York city and vicinity.

INSECTS AT WATCHOGUE AND BEULAH LAND, STATEN ISLAND, N. Y.

By WILLIAM T. DAVIS.

Charles Lamb is said to have preferred the city because that marked changed of the seasons which he witnessed in the country was nearly absent from the paved streets. But to most people this gradual march of the year is pleasant—the ushering in of spring, the hospitable days of summer that seem to invite you to sleep out of doors, the cool invigorating autumn and the still more brisk season of winter, pass like changing scenery before a car window. In the same way the varied prospect offered by even so small a piece of mother earth as Staten Island—the change from rocky hills to barren sandy tracts and salt meadows—is ever inviting. It is pleasant to make numerous comparisons as the season advances, to walk from the hills over to the sandy ground, or to the meadows, for in nature comparisons are not odious. One of the most interesting of these sandy tracts lies about Old Place meadow, in the midst of which is the tortuous Old Place creek, an arm of the Sound. The sandy point that projects northward into the meadow is called Beulah by the natives in a spirit of irony, but to a naturalist it is truly Beulah Land and most interesting.

The standing or upright Clematis (*Clematis ochroleuca*) grows at wood paths and, spreading its wings, displays its beautiful colors, or flying up into some tree, particularly a red maple, crawls about the terminal branches. There are few signs of spring when this moth arrives, the wood paths are brown, and the contrast of its bright colors with the dead leaves is one of the memorable sights of the season.

A little later *Thecla augusta* makes its appearance in considerable numbers, seeking the sheltered, sunny places, and often alighting on the sweet-ferns, the huckleberry bushes and the pines. It is said that the food-plant of this Indian colored butterfly is unknown, and it is to be regretted that Staten Islanders have not been more industrious in gaining this point of information, for probably nowhere in the vicinity of New York can it be so easily obtained.

On the 8th of May, 1881, while in company with Mr. Leng, six or seven *Thecla niphon* and a single *Thecla damon* (*smilacis*) were collected at Watchogue. Perhaps these two butterflies have appeared since, but every spring the sandy stretch of road where they occurred on that May day has been visited without seeing them again. Wood fires are altogether too frequent, and possibly the colony was thus destroyed, as have been many rare plants. The growing fraternity of tramping naturalists should utter upon every opportunity their protest against burning the woods. Many ignorant boys set fire to the dry leaves for "the fun," as they say, of seeing them burn, and thus much that is interesting and beautiful in the country is permanently destroyed.

Papilio ajax was seen on June 30th, 1889, near Old Place creek, but it was in its customary haste. *Nisoniades brizo* is one of the most common butterflies of the vicinity, and *Euptoieta claudia* one of the rarest.

Early in April *Cicindela modesta* commences to fly on the sand dunes. This beetle is, as a rule, quite local, confining itself to certain dunes, but stragglers are to be met with elsewhere. During the summer a few are seen, and in September and October they make their second general appearance.

Cicindela generosa is also quite plentiful on certain sandy stretches. It has been taken in company with *C. vulgaris* as early as the 9th of April and as late as the middle of October. *Cicindela repanda* also puts in appearance during the first days of April, coming earlier than *hirticollis* by over a month. *Omophron americanum* may be washed from the banks of Old Place brook, and the funny little protective-colored *Elaphrus ruscarius* has been found running in the muddy ditches by the side of the road.

Watchogue and Beulah Land have been industriously explored in quest of Orthoptera, and none collected have proved more interesting than the small wonderful jumping cricket, *Tridacytlus terminalis.* These little creatures occur along Old Place brook and in the damp ditches by the road side, from May to September. Their power of leaping is so remarkable that they seem to disappear quite mysteriously and one wonders which way they have gone. It is seldom that their departure can be accurately followed by the eye.

Among tree-crickets, *Œcanthus, niveus, angustipennis, nigricornis* and *latipennis* have been found, the latter being the most local of the four. The best way to collect tree-crickets is to become acquainted with their notes, after which simply walking through the woods and over grown pastures, especially about the hour of sunset, will disclose what kinds are to be found in the district. They are energetic though faint songsters, and even the cold summer storms that seem so discouraging cannot hush their tingling lays.

Another interesting Cricket is *Phylloscirtus pulchellus.* It is not a good jumper, but has a comely shiny coat of mail that makes it ever a pleasing insect. It runs about the tree branches, especially those of the sweet gum, and in the fall, when it is chilly, it will often be found hidden in a curled leaf, from whence issues its continuous rolling song.

Four kinds of cone-headed Katydids reside about Old Place creek; three of them, *ensiger, dissimilis* and *robustus,* often occupying the dry dunes. When they live in such situations they are more often protectively sand colored than their fellows which reside in the green pastures. The fourth species, *Conocephalus exiliscanorus,* lives in the tall meadow grass along the creek itself, and sings its lazy slow song from and later in the summer a pupa case was discovered on a black-jack oak, also on sandy ground.

In 1894 the distribution of the 17-year Cicadas about Old Place meadow was particularly interesting. They were quite rare on the most sandy districts along its southern edge, though abundant in the woods on its eastern margin. It was in this last mentioned place where pupæ cones were found on the 8th of April under some boards that did not lie sufficiently close to the ground to prevent their construction. Later these pupæ cones were discovered in considerable numbers along Willow Brook, a mile or two away. They were found in the woods under stones, logs and the chips about the stumps of trees cut down in the winter. Many more were without protection of this kind, the cones rising among the dead leaves, occasionally to the height of three inches.

There has been much written about the periodical Cicada, but it is certainly one of the most interesting of insects, and attracts the attention of all thoughtful persons. In June days in locust year its song sounds like the hum of an ever-busy factory. There is a continuous roar in the trees and the bird notes form but an unimportant part in the melody of nature. If you cease listening to Cicadas, then you may hear the bird's songs, for the singing of the insects is so constant that you may easily forget that it exists. Man writes poems on love, but the male Cicada utters his love song with a greater vim. He is no laggard in love and would please Sir Walter Scott mightily. He lifts his body and calls Phar-r-roah, a song of but a few moments duration, and quickly flies away, for why should he tarry when Chloe comes not? Thus he flies on the warm days from tree to tree, and mayhap at last meets his red-eyed spouse.

◆

Thecla acadica was taken June 29th at Greenwood Lake, New Jersey, by Mr. Wm. Sachs. As far as we are aware this is the first record of the occurrence of the species in this vicinity. *Catocala coccinata* was also taken at the same place, and also *Phyciodes nycteis*, which appeared in abundance.

Two specimens of *Dichelonycha fuscula* were taken at Valley Stream, Long Island, in July.

WM. B.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF MAY 21, 1895.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Ten members present.

Dr. E. G. Love and Mr. Martin Birnbaum were proposed for active membership by Mr. Beutenmüller.

An invitation from the Newark Entomological Society to attend their field meeting on Decoration Day, at Orange, N. J., was received and accepted with thanks.

A lot of rare insects from Florida and New Hampshire were donated to the Society by Mrs. Slosson with the request to sell them for the benefit of the JOURNAL. On motion a vote of thanks was extended to Mrs. Slosson.

Mr. Palm spoke on collecting insects and exhibited his apparatus.

Adjournment.

MEETING OF JUNE 4, 1895.

Held at the Americam Museum of Natural History. President Zabriskie in the chair. Twelve members present.

Dr. E. G. Love and Mr. Martin Birnbaum were elected active members of the Society.

Mr. Zabriskie told how the foot stalks of the leaves of the maples at Flatbush, Long Island, were injured by some insect which caused them to fall, but was unable to detect species.

A discussion as to the merits of sweeping and beating for insects

JOURNAL

OF THE

New York Entomological Society.

Vol. III. DECEMBER, 1895. No. 4.

THE LIFE-HISTORIES OF THE NEW YORK SLUG CATERPILLARS.—I.

PLATE VI, FIGS. 1–19.

By HARRISON G. DYAR, A. M., Ph. D. and MISS EMILY L. MORTON.

INTRODUCTORY.

The authors of the series of articles, of which this is the first, have long been interested in the species of Eucleidæ found in this country, especially in their larval state. We have concluded to present jointly a full account of the life-history of each species, as rapidly as we are able to work them out. The accounts of the habits are by Miss Morton, and the labor of obtaining fertile eggs has been performed by her. Dr. Dyar has prepared the technical descriptions.

The following is a preliminary synopsis of the different species known to occur in New York State, listed in ascending order. We are unable to make it final at present, for the reason that several of the forms are still imperfectly known, and there may be one or two more species than we now recognize. It will, however, serve to outline the scope of our work, but we shall not be able to present the descriptions consecutively. It is, perhaps, unnecessary to state that we would feel duly grateful to receive larvæ or cocoons of any of the less known species (marked with an asterisk below) or of any species not on this list.

SECTION I. Spined larvæ.—Larvæ with spinose processes; the spiracle on joint 5 higher up than those on joints 6 to 12 and the tubercle above it missing.

Type 1. Three distinct tubercles on the last two thoracic segments. Subdorsal row on joints 4 to 13 converted into detachable, hairy, fleshy appendages.

Phobetron pithecium.

Type 2. Only two tubercles on the thoracic segments. Spines arising from fleshy horns more or less developed. Dorsal and lateral areas both broad.

Without patches of long, detachable skin spines between the terminal horns

Horns short, the purple dorsal band without black lines.
Adoneta spinuloides.
Horns partly long, the bluish dorsal band four times lined with black.
Euclea indetermina.
With one pair of spine patches. The red subdorsal band entire or broken by marks concolorous with the side lines.......... **Euclea pænulata.**
With two pairs of spine patches.
Horns short; the red or yellow subdorsal band conspicuously broken by quadrate discolorous patches.................. **Euclea delphinii.**
Horns partly long, partly obsolete. A green dorsal "blanket" with central purple patch.......................... **Sibine stimulea.**

Type 3. As in type 2, but the pair of horns of joint 13 consolidated into a pointed tail. Tubercles and spines much reduced, obsolescent...... **Parasa chloris.**

Type 4. Dorsal space contracted, larva much flattened. Horns tapering, flattened, projecting laterally, fringed by the slender spines. Green with few red dots between the yellow subdorsal lines..... .... **Sisyrosea inornata.**

SECTION 2. Smooth larvæ. Without any spinose horns or processes. Tubercles obsolete or obscurely setiferous. Spiracles in line; all the tubercles represented.

Type 5. Dorsal and lateral spaces both broad, subventral space narrow. Last segment rounded quadrate. Color green.
Without dorsal red marks.
Yellow subdorsal line bordered above by a dark shade.
Apoda y-inversa.
"Similar" to the preceding.................. * **Apoda biguttata.**
No bordering shade to the subdorsal line....... **Tortricidia fasciola.**
With dorsal red marks.
A large, blurred, red cross covering the back.... * **Tortricidia flavula.**
A small, red cross in the middle of the back.. *(?) **Tortricidia testacea.**
A tiny red dorsal dot centrally and series of red dots near anterior end or a continuous red band. .... *(?) **Heterogenea flexuosa.**

Type 6. As in type 5, but the body ends with a pointed tail.
Whitish green with straight subdorsal line...... * **Packardia geminata.**
Yellowish green with wavy subdorsal line........ * **Packardia elegans.**

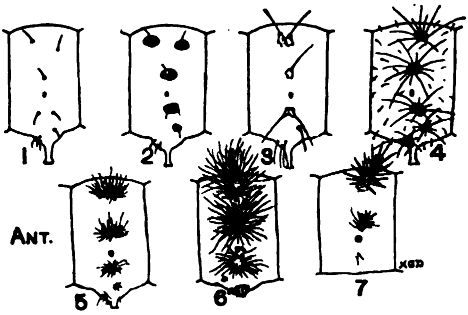
the synonymy. The name Eucleidæ was proposed in the works of Messrs. Neumoegen and Dyar and of Professor J. H. Comstock. The term Apodidæ of Mr. Grote (Syst. Lep. Hild. 1895) is synonymous as is also the term Heterogeneidæ of Mr. Meyrick (Handb. Brit. Lep. 1895.)

GENERAL CHARACTERS.

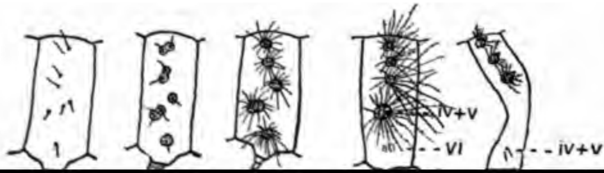
Eggs. The eggs of the several species of Eucleidæ do not offer specific differences, as a rule. The shell is very thin, skin-like, not distinctly ornamented. The egg is elliptical in outline and greatly flattened, so much so as scarcely to present a measurable thickness (to the naked eye), at least when freshly laid. They are deposited singly or in groups, in the latter case overlapping like the shingles on a roof. This type of egg is found in other groups of the Microlepidoptera, and refers the Eucleidæ to this superfamily.

Larva. The head is modified from the type usual in Lepidoptera in lacking in all that portion of the corneous case above the clypeus the usual hard character. It is withdrawn under joint 2, which folds over it like a hood. Joint 2 is more or less completely withdrawn under joint 3, and is usually unornamented, so that the first segment completely visible from above, and the one on which the various markings commence is joint 3 (the mesothoracic segment). The prothoracic shield is present, but more or less rudimentary and always functionless. The segments are of the usual number, thirteen, the last one small and not showing its compound nature by a constriction, as is often the case in the lower Microlepidoptera. All the segments are closely united, the separating incisures often very obscure and difficult to distinguish. The body is flattened by the reduction of the feet and subventral area; in general outline elliptical, the dorsum arching more or less, as the height is considerable or the reverse. The thoracic feet are very small, the abdominal ones wanting, the whole ventral region being flexible and adapted for locomotion. Dr. Chapman states (Trans. Ent. Soc. Lond. 1894, p. 345) that there are suckers on the first eight abdominal segments, though the first and last of these are poorly developed; these suckers are probably homologous with prolegs.

The abdominal tubercles are derived from the highest Microlepidopterous type. Primitive tubercles i and ii consolidated, iii single, iv and v consolidated, all converted into many haired warts, thus giving three segmentary rows of setiferous warts, subdorsal, lateral and subventral. By the reduction of the subventral area, the third row of warts is obsolete, represented in the Eucleidæ by a few weak setae. The other two rows are functional and compose the armature of the several species. The evolution is illustrated in the accompanying cut



(figs. 1 to 7), which shows a series of segments advancing from the most generalized type up to *Sibine stimulea.* The thoracic warts are also derived from the Microlepidopterous type; but are more modified. In this type there are five warts formed from the primary and subprimary tubercles i*a*+i*b*, ii*a*+ii*b*, iii, iv+v and vi as shown in figures 9 (*Simæthis pariana*) and 10 (*Ino pruni*). In the Megalopygidæ (fig. 11) a reduction has been effected in the lower row as on the abdomen (fig. 6). In the Eucleidæ, one more row is rudimentary on both thorax and abdo-



series of species with reduced tubercles and in the lowest of the spined Eucleids (*Phobetron*, fig. 12); but in the higher spined forms, the middle row disappears, precisely as it has disappeared on joint 4 of *Megalopyge*, probably in response to a similar need. In all the spined Eucleids, there is also a reduction in the number of warts on the first abdominal segment, which will be specially described under *Sibine stimulea*.

Along the three abdominal rows of tubercles, and correspondingly on the thorax, the body is more or less ridged. We shall call these the subdorsal, lateral and subventral ridges respectively. Owing to them a section of the body of a Eucleid larva forms a hexagon instead of a circle, as in most other Lepidoptera. This may be regarded as the fundamental type (fig. 13), though it nowhere actually exists that we know of. Usually the space between the lateral and subventral ridges is contracted, giving the form shown in fig. 14. In *Sisyrosea* the uppermost space is also contracted, giving the form of fig. 15, the flattest Eucleid larva known to us. In *Eulimacodes*, a quite different process has taken place. Instead of the lower side-area being contracted, the upper side-area is reduced nearly to obliteration, and we get the outline of fig. 16, a square.

The surface of the body is divided by these ridges into three areas. We shall name them as follows:

The unpaired dorsal space between the two subdorsal ridges we shall call the dorsal space. The space on each side between the subdorsal and lateral ridges, the lateral space. The space between the lateral ridge and the lower edge of the body, which contains the spiracles, the subventral space.

The surface of the skin is not smooth in the later larval stages, but is sunken in certain more or less well defined areas. These areas have a flat bottom and more or less perpendicular sides and appear to be possible in these larvæ on account of the unusually thick skin. They have the following definite arrangement, though they may be imperfectly developed or even partly absent, as we shall describe in individual species: In dorsal space (1) a median row of large depressions, intersegmental, we shall call the dorsal row; (2) a paired row just above the subdorsal ridge; segmental, and therefore alternating with the dorsal, we call the addorsal depressions. In the lateral space (3) a segmental row of small depressions just under the subdorsal ridge, the upper lateral segmental, (4) a large intersegmental row in the middle of the lateral space, the lateral depressions, two rows closely alternating and nearly in line (5) one segmental, (6) the other intersegmental, just above the lateral ridge, we shall call the lower segmental and lower intersegmental lateral respectively. In the subventral space, two intersegmental rows one above the other, the lower a little the most posterior, will be called (7) the upper subventral and (8) lower subventral; finally between the latter may be developed (9) a small segmentary row just above the ventral edge; and the smallest depressions of all, only rarely seen, are (10) the stigmatal row, situated segmentarily above and before the spiracles. Each of these depressions contains one or more glandular centers which appear as small rounded patches. They are more primitive than the areas themselves,* and may appear when the latter are scarcely distinguishable. The dorsal depressions correspond to four glandular centers, a paired row on the anterior and posterior edge of each segment, consolidated intersegmentally; the other depressions seem to have but one center. †

The setæ on the warts vary greatly, but are only rarely primitive setæ. They will be specially described. The skin surface is covered with minute points, which usually are converted into clear granules. These also come under the series of special characters. In general the depressed areas are smoother than the elevated portions of the surface.

Cocoon.—The cocoon is composed entirely of the secretion of the spinning organ. It is closely woven and forms a hard, compact, though thin layer like stiff cardboard. It is so constructed that one end opens in the form of a circular lid at slight pressure. This structure is similar to that of the Megalopygidæ, but is an improvement on it, being more compact, definitely rounded and smooth. The lid is not visible in the intact cocoon, as in the case of the lower family just mentioned. The [redacted]

Pupa.—This is characterized as follows by Dr. Chapman: Belongs to the Incompletæ. Less solid and rounded than in the Obtectæ, appendages partially free. Free segments extend upward to the third abdominal; 7th free in the male, fixed in the female. Dehiscence accompanied by freeing of segments and appendages previously fixed; pupa progresses and emerges from cocoon. (Trans. Ent. Soc. Lond. 1893, p. 118.)

Moth.—We shall not treat of the structure or relations of the moth in this series of articles. For the position adopted see Comstock (Wilder Quart. Cent. Book p. 104) Chapman (l. c.) and Dyar (Trans. N. Y. Acad. Sci., vol. XIV, p 54).

Apoda y-inversa *Packard.*

1864—*Limacodes y-inversa* PACKARD, Proc. Ent. Soc. Phil. Vol. III, p. 341.
1882—*Limacodes y-inversa* GROTE, New Check List, p. 17.
1886—*Limacodes parallela* HY. EDWARDS, Ent. Amer. Vol. II, p. 10.
1891—*Limacodes y-inversa* SMITH, List Lep. p. 28.
1892—*Apoda y-inversa* KIRBY, Syn. Cat. Lep. Het. Vol. I, p. 553.
1894—*Apcda y-inversa* NEUMOEGEN & DYAR, Jour. N. Y. Ent. Soc. Vol. II, p. 74.

LARVA.

1894—*Apoda y-inversa* DYAR, Ann. N. Y. Acad. Sci. Vol. VIII, p. 221 (mature larva).

SPECIAL STRUCTURAL CHARACTERS.

Dorsal space broad, narrowing slightly toward the extremities, ending behind in the broadly quadrate joint 13, not strongly arched. Lateral space broad, oblique, scarcely concave, narrowing a little toward the extremities. Subventral space very small, contracted. Subdorsal ridge at first prominent, later smooth, consisting of the rounded angular change in direction of slope between back and sides. Lateral and subventral ridges moderately prominent, approximate, the lateral at first tubercular, later smooth. Ancestral warts reduced; in stage I the subdorsal setæ ia + ib on joint 4 and i + ii on 5–12 are represented by single spines with a slight central process, which lean in alternating directions on successive segments (Pl. VI, fig. 1); later the warts are represented by tubercles bearing two setæ on subdorsal, one on lateral ridge (Pl. VI, fig. 8); in the last stage obliterated, the rudimentary setæ persisting. Subventral setæ rudimentary. Depressed areas well developed, though not extraordinarily so, rather small, rounded, slightly sunken, not very sharply defined, smooth. The series numbered 1 to 8, inclusive, may be distinguished. Skin at first smooth, later covered with short secondary spines, and finally with closely-crowded, round, clear granules of somewhat unequal size. After the last molt the specific colorational characters definitely appear, and the setæ are nearly obliterated.

The coloration is uniform green with certain yellow lines, evidently adapted to escape observation.

The larva is a typical Eucleid, not highly specialized, yet without any very generalized characters. The peculiar structure and arrangement of the subdorsal setæ in stage I cannot be congenital in our view,* but may be some special adaptation to this stage, in which the larva does not feed. Later the primitive tubercles appear as reduced and finally rudimentary structures. The spiracles are in line, normal. The depressed areas, characteristic of the family, are in a state of moderate development, while the skin granulation is also intermediete between such extremes as *Sibine* and *Eulimacodes*.

AFFINITIES, HABITS, ETC.

This species is related to the European *Apoda avellana* (*Limacodes testudo*) in a close degree. The larvæ seem not to differ, to judge by Dr. Chapman's description and by a well prepared specimen from Staudinger and Haas. The moths only differ in that *y-inversa* is usually less suffused with brown, while *avellana* is rather smaller, more like our *A. rectilinea*.

We may regard this species as derived from a former circumpolar fauna, whose near allies are not now found in tropical South America, as we will show to be the case with *Sibine* and *Eulimacodes*, but in the northern temperate regions of both the old and new worlds.

---

* These structures appear in *Tortricidia fasciola*, stage I (Packard, Proc. Amer. Phil. Soc., xxxi, pl. ii, figs. 15-16) and in *Apoda avellana* (Chapman, Trans. Ent. Soc. Lond. 1894, pl. vii, figs. 16-18.) Dr. Chapman remarks (l. c., p. 345) "When the larva has completed its development within the egg shell . . . it is

The larvæ of the nearest American allies of *A. y-inversa* (*A. rectilinea* and *A. biguttata**) are unknown. It differs as follows from *Tortricidia fasciola*, which is the only larva at present known at all resembling it: More elongate, less shortly rounded than *fasciola*; sides less concave, the tail the same. Color much less transparent, not the clear yellowish green, but whitish, opaque. Depressed spots blurred in the whitish ground, not indicated by broad pale yellow rings. Setæ obsolete in both, but the skin of *fasciola* is more coarsely and irregularly granular, the incisures marked, cleft-like, while they are obscure in *y-inversa*. The subdorsal line is distinctly bordered above by a dark shade, whereas in *fasciola* there is no other color than the yellowish green and yellow.

The eggs are laid singly, and the larvæ after hatching eat only the parenchyma of the leaf for the first two feeding stages. The manner of feeding is characteristic of the species. *Y-inversa* feeds in a track on the upper side of the leaflet the width of its body. (Plate VI. fig. 19, stage II; fig. 13, stage III.). In the fourth stage and after it eats the whole leaf (Plate VI. fig. 16, 17). At New Windsor, the larva has been found only on the species of hickory; it has occurred on hickory in Van Cortlandt Park, New York City, and near Glendale, L. I.; Dr. Thaxter also reports it on this food-plant. The larva described by Mr. Dyar was found on oak, but the identification is not positive as *y-inversa*.

The larva of *y-inversa* seems to be not commonly found. At New Windsor a few are occasionally taken in the bags placed on the growing trees for the confinement of other hickory feeding larvæ. Near New York City the larvæ occur mostly on low hickory shrubs, always singly. They are subject to the attacks of a number of parasites in consequence of which their numbers are greatly diminished.

There is but a single brood during the year. The moths (Plate VI, fig. 9) fly during the first half of July. The males seek their mates soon after dark, between half-past eight and nine o'clock, flying with unerring instinct directly to that part of the cage where the female is clinging. After pairing the moths remain *in coitu* until about the same time the next evening. The females immediately after begin to lay their eggs, and continue night after night until all are laid.

The mature larvæ may be found early in September, making a period of about two months to complete the seven larval stages.

---

* We believe the identification of this larva by Dr. Packard (5th Report, U. S. Ent. Com. p. 147) to be founded upon error.

CRITICISM OF PREVIOUS DESCRIPTIONS.

The only notice of this larva, besides the mention of the food plant by Dr. Thaxter (Can. Ent. XXIII, 34), is the one by Mr. Dyar, referred to above. This differs from the larvæ before us in that no mention is made of the yellow line on the anterior portion of joint 3. As the determination was not made positively, it is possible that Mr. Dyar may have had the larva of *A. biguttata* before him. In a letter written in 1891, is the following from Dr. Thaxter: The larvæ of "both the *Limacodes* you mention (*biguttata* and *y-inversa*) are very much alike, green or slightly yellowish, slightly dome-shaped with slight longitudinal ridges and certain lighter dorsal markings. . . . . Quite different from *scapha.*"

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—With the characters of the family. Reticulations obscure, linear, rounded, scarcely angular, yet not separated into isolated areas, not characteristic. Elliptical, 1.6x1.2 mm. Laid singly in nature. Of the usual yellow color.

Stage I.—Head entirely brownish black, enclosed in joint 2; width .3 mm. (calculated .28 mm.). Rounded elliptical, the subdorsal and lateral ridges prominent, consisting of segmentary tubercular elevations, causing the dorsal area to form a furrow, and the lateral to be concave; ends square, subtruncate. Skin perfectly smooth, no granules of any kind. Primitive tubercles i+ii represented by a series of large, segmentary spines, double on joints 3 and 13, single, but with a small knob-like projection about the middle on the other segments. (Pl. VI, fig. 2.) On the abdomen these spines alternately double throughout the subdorsal ridge, the primary setæ pointed, some of the secondary a little swollen at tip. Lateral ridge bears three setæ on joints 3 and 4 and a long, slender one on joint 13, its tubercle scarcely larger than the secondary ones. Dorsal and ad-dorsal depressions ill-defined, smooth, the tubercles on the rounded latticed ridges; a single row of lateral impressed areas, the spinose tubercles mostly above them; subventral region finely granular, not setiferous. Color green, a broken whitish stripe along the subdorsal ridge. Length 1.5 to 2 mm.

Stage III.—Width of head .5 mm. (calculated .54 mm.). Shape as before, the dorsum depressed between the prominent subdorsal ridges; lateral ridge also prominent, composed mostly of the large tubercles. Dorsal depressed areas well defined, the colorless tubercles with short secondary setæ on the latticed ridges; the lateral areas defined as far as the central and upper rows, the lower double row not distinguished. Lateral latticed ridges quite well-defined, but rounded, not sharp like the dorsal ones. Secondary tubercles sparse. Primary tubercles large, conical, with two setæ on subdorsal and one on lateral as before. Fine setæ are present on joint 2, four in the region of the cervical shield, one before the spiracle. Color green with a pale yellow subdorsal line below the skin. Length 2 to 3 mm.

Stage IV.—Width of the head .75 mm. Elliptical, rounded at both ends, evenly arched, highest about the middle; ridges moderately rounded, the subdorsal with two long, coarse setæ, the tubercles low, most of the secondary setæ reduced to skin spines, but a few still distinct bristles. Lateral ridge with single large seta and many small ones as before. Dorsal space with sparse clear granules, scarcely setiferous, but spined. The dorsal impressed spaces show as white intersegmental spots, the ad-dorsal as circular hollows; smooth, not discolored. A yellowish white row of spots, alternating with the tubercles. Lateral space rather coarsely granular, the depressed areas smoother, ill-defined, not discolored. Subventral area only sparsely granular, the intersegmental hollows elliptical longitudinally. Length 3 to 4.2 mm.

Stage V.—(Pl. VI, fig. 18, side view; fig. 6, front view; fig. 3, lateral tubercle, figs. 16–18, life size.) Width of head 1 mm. (calculated 1.04 mm.). Elliptical, the posterior end quadrate, evenly arched. Subdorsal and lateral ridges made prominent by segmentary, high, conical tubercles. Green; a distinct yellow line under the subdorsal ridge, slightly waved, not reaching the anterior edge of joint 3, which is yellow to the lateral area. Spines dark. Skin with sparse clear granules, becoming short clear spines on the ridges, but in small number (Pl. VI, fig. 3). Impressed spots not large, well-defined and smooth, not very deep; the dorsal as before; lateral ones all present, of the two rows above the lateral ridge (Nos. 5 and 6), the segmental are a little higher up than the intersegmental, both small. The two subventral rows small, rounded, the lower a little anterior to the upper, not at all confluent. The color is a leaf green, like the under side of a hickory leaf, neither very yellowish nor whitish. The tubercles seem smaller than in the previous stage, the setæ more slender and less conspicuous. Toward the end of the stage the yellow lines become very distinct, the subdorsal bordered above narrowly, and mainly in the hollows of the undulations with dark clear green. Impressed spaces all yellowish. Length 4.2 to 7 mm.

Stage VI.—Head green, eyes black, jaws brown; width 1.4 mm. (calculated 1.44 mm.). Smooth, rounded, no tubercles on the ridges (Pl. VI, fig. 4 for front view), lateral outline low arched, highest a little before the middle. Setæ black, pointed, two on subdorsal ridge, one on lateral ridge. Color soft green, much as before, a yellow line anteriorly on joint 3, broad and distinct, joining a white line along the subventral edge. A yellow line along the subdorsal ridge, from the middle of joint 3 to the end of the broad tail, incised by the addorsal depressions, the scallops filled in with dark green. All of the dorsal, and two of the lateral (4 and 5) impressed spots pale yellow. A row of intersegmental yellow spots below skin along lateral ridge. Skin closely covered with conical granules, many quite sharp pointed. Dorsal depressed spaces small, smooth, moderately deep; lateral ones obscure, hardly defined. Length 6.5 to 10 mm. Differs from Stage V in having the ridges smooth, except for the short setæ, rounded closely appressed and somewhat irregular (Pl. VI, fig. 7). Impressed spots small, rather deep, the bottom with a transverse groove in the dorsal plates, the rest finely granular; upper and lower segmental lateral spaces not discolored, the latter obscure. A row of small yellow dots beneath he skin of lateral ridge.

Five days after the molt the color is a bright, rather yellowish green with a slight whitish cast. The dark border to the subdorsal line appears continuous to the naked eye.

Six days.—Becoming whiter, like *Packardia geminata.* The lateral ridge is green, but the rest is rather opaque whitish green. Subdorsal line very distinct, pale yellow, spotted with an orange tint intersegmentally, edged above continuously with blackish green, widest segmentally. Yellow line on joint 3 anteriorly not orange shaded, fading into the white subventral line. Depressed spaces marked by faint yellow rings, as the glandular centers are green.

Seven days.—Still whiter. A fine whitish green, shading more translucent down the sides. On the tenth day the larva shrunk up, turned of a pale whitish and lost its hold on the leaf; the next day it had spun its cocoon. Length 9.3 to 15 mm.

Cocoon.—(Pl. VI, fig. 12.) With the characters of the group.

EXPLANATION OF PLATE VI.

(*Apoda y-inversa.*)

1. Stage I, side view, showing the arrangement of the setæ: enlarged.
2. One of the subdorsal abdominal setæ (after Chapman).
3. A tubercle of the lateral row, stage V, showing skin spines × 175.
4. Front view, stage VI.
5. Front view, stage VII.
6. Front view, stage V.
7. A seta of lateral row (same view as fig. 3) in last stage, showing skin granules × 175.
8. Side view, stage V, showing arrangement of setæ.
9. *Apoda y-inversa*, female.
10. Last stage, side view, showing the areas of the body.
11. The same, dorsal view.
12. Cocoon, on a leaf of *Carya alba.*
13. Feeding marks of the larva, stage III.
14. Mature larva, side view.
15. Mature larva, dorsal view.

16, 17. Larva in stage V.

18. The same, side view.
19. Feeding marks of the larva, stage II.

(Figures 9, 12 to 19 by Miss Morton; figures 1 to 8, 10 and 11 by Dr. Dyar.)

[NOTE.—The plate has been too greatly reduced so that 8 per cent. should be added to the dimensions of the figures to make the above measurements apply exactly.]

ON THE PROBABLE ORIGIN, DEVELOPMENT AND DIFFUSION OF NORTH AMERICAN SPECIES OF THE GENUS DIABROTICA.*

By F. M. WEBSTER.

This genus of Coleoptera is almost exclusively confined to the western hemisphere, with its native habitat, seemingly, in the Neotropical Region. In fact South America would appear to have been its original home, from which country the eighteen species known to inhabit North America north of Mexico might almost be supposed to have originally sprung, while one of these species, *balteata*, appears to have unchanged, spanned the borderland, so to speak, being found from Texes southward to Colombia, South America. The species of this genus number something like four hundred, which fact, when compared with the limited number occurring in our own fauna, would of itself suggest that we were on the extreme outskirts of its northern habitat. With this idea of the northern spread from the tropical habitat in mind, we can readily comprehend the evolution of the two species, *12-punctata* and *soror*, the former ranging over the eastern region from Canada to southern California and possibly into Mexico, while the latter ranges from Oregon southward, also into Mexico, and covering Arizona. It is as if from out of the Lower Sonoran of Mexico twin species had been evolved, the one, *soror*, making its way to the west of the great mountain range, while the other, *12-punctata*, spread over the country to the north and northeastward. It is true these two species occupy the same area in Arizona and southern California, but I believe that a careful study of the former species was not known to be destructively abundant in that portion of Illinois. I have ample proof that *longicornis* breeds in destructive abundance in bottom lands along the Wabash River in Indiana, which lands are subject to overflow annually, sometimes as late as May or even June, thus indicating that both of these species may breed freely in very low lands. Unfortunately, the earlier stages and habits of the larvæ of *soror* are unknown, and we cannot say whether it breeds in high or low lands, nor can I say whether or not it prefers the higher elevations of cultivated areas.

In the species *vittata* and *trivittata* we have the same phenomena as to distribution, the latter species occurring throughout California and possibly southward, while the former ranges over the whole eastern portion of the United States and into Canada, to the north, while it extends southward into Mexico, where we shall probably find that both species cover the same area, though probably at different elevations. In New Mexico, Prof. Cockerell has found a form intermediate between these species and occurring between the regions occupied by them, which he has called *incerta*, and which extends also southward into Mexico. *D. tricincta*, which occurs from Central America northward to Colorado, might almost be said to occupy the same relation towards *D. 12-punctata* and *soror*, though Prof. Wickham found both at Albuquerque, New Mexico, and Prof. Snow took both at Socorro, N. M., the elevation of both localities being 5,000 feet. Prof. Cockerell writes me that he finds *D. 12-punctata* rarely at Santa Fé, elevation 7,000 feet, while it is abundant in the Mesilla Valley, elevation 3,800 feet; *tricincta* being rare. It certainly looks as though there was somewhere in Mexico or Central America a veritable nursery for species, and where the evolutionist might revel in a scientific paradise. I cannot help feeling that within the borders of Central America and Mexico we may sooner or later discover the key that shall solve the mystery of the origin of many of our species of *Diabrotica*.

To me *longicornis* is above all others the most interesting of the *Diabrotica*, not because of its economic importance, but on account of its extended range and peculiar distribution. Occurring, as it does, from Yucatan northward through Mexico, New Mexico to Colorado, Kansas, Nebraska and Iowa, it sweeps to the northeast through Illinois, Indiana and western Ohio, while it is known to occur abundantly about Buffalo, N. Y., where it has been collected by Mr. Reinecke, and also at Aulac, New Brunswick, by Mr. W. Hague Harrington. With the possible exception of the Boreal, it thus inhabits every Life Zone on the continent of North America. This species appears to prefer the lower altitudes, as it has not been found above the 5,000-foot level, and over the area of its greatest abundance in the Mississippi valley the elevation is generally less than 2,000 feet, and in Illinois, Indiana and Ohio it is less than 1,000 as a rule. I have previously shown that it can breed freely in low and damp localities, and Mr. Harrington found it in New Brunswick abundantly in the "dyked lands" known as the Big Tantramah Marsh. The rapidity with which this has increased in numbers, in some portions of the country, during quite recent years, is simply astonishing. Where I could scarcely get specimens enough for a series in my collection, twenty years ago, it is now one of the most injurious insects known to the farmer, and this, too, at an elevation of not over 900 feet. Over the western third of Ohio, across Indiana and Illinois to the Mississippi River, through Iowa, eastern Kansas and eastern Nebraska, is largely a prairie country, and such a part of this area as was in cultivation up to 1860 was devoted mainly to wheat growing. From about 1865 onward farmers ceased to raise wheat as a leading crop, and corn became king of the cereals. Sometime between 1865 and 1875 this species of *Diabrotica* seems to have been attracted to the immense corn fields by the inexhaustible supply of food they afforded for the adults, and as later investigations have shown, for the larvæ also, and these immense stretches of corn lands soon became breeding grounds for vast myriads of the insect. So far as we now can see, the centre or this outbreak, if such it might be called, was in central or northern central Illinois, and it is here that appears to have evolved a race not differing specifically or perceivably, yet whose larvæ develop on the roots of Indian corn, while the adults may subsist alike directly northward or southward, and the valleys of these streams are largely devoted to corn growing, the land being continually planted year after year, in some places since the beginning of the present century. This species appears to gain access to these valleys from the west, and we find that one after another is being overrun in the eastward march of the species. First it appeared in the valleys of the Little and Big Miami Rivers, then the Upper Wabash and Maumee, and this year it occurs throughout the entire length of the Scioto River and the upper portion of the Sandusky River, thus nearly covering the western third of the State.

The distribution of *D. atripennis* and its varieties is given by Dr. Horn (Trans. Am. Ent. Soc. Vol. XX, p. 95) as extending from Massachusetts* to Dakota, Kansas and Texas. It does not appear in the lists of Coleoptera collected about Buffalo, N. Y., by Reinecke and Zesch, or about Cincinnati, Ohio, by Dury, about Detroit, Mich., by Hubbard and Schwarz, or at Iowa City, by H. F. Wickham. Years ago, when I was engaged in exchanging Coleoptera, this appeared to be one of the species most desired among collectors, though I never failed to find the var. *fossata* in abundance during August and September, in northern Illinois, at an elevation of little more than 800 feet. Prof. Cockerell records it from Gallinas Cañon, New Mexico, at an elevation of 7,000 feet.

Except *vincta*, which is an extreme Southeastern species, all of our Diabroticas appear to have originated in the extreme Southwest, Mexico and Central America, at least such as we cannot trace directly to South America. The Rocky Mountains appear to have formed a divide in the current and sent two species to the west coast, while to the east of these mountains, *vittata*, *12-punctata* excepted, all appear to have worked their way northward along the eastern base of this range, until reaching Colorado and Kansas, when they have swept broadly to the northeast, precisely as has *longicornis*, which Say discovered in 1824, near the base of the Rocky Mountains.

Prof. Cockerell has sent me the following list of *Diabrotica*, found in the West Indies, all being from Cuba. *D. annulata*, *cyanospila*, *impressa*, *loricata*, *relicta* and *semicyanea*. *D. amœnula* and *D. octonotata* are from Pacific islands, and *D. limbata* from the Galapagos group. This may be a good place to call attention to the fact that Jacoby's list of the phytophagous coleoptera of Japan, gives a single species, and that, *D. rufotestacea* Motsch., as doubtful as to the genus. Curiously enough, *D. 14-notata* has been described from Madagascar, which, if the genus proves correct, will go to substantiate the statement of Dr. A. R. Wallace, that the fauna of this island is more closely allied to that of South America than to South Africa, to which it lies almost contiguous.

---

*Specimens collected about Lowell, by Mr. Frederick Blanchard, are much lighte in color than are western specimens.

With respect to the food of the species of *Diabrotica*, I have no data except as to species of our fauna. The name means one that gnaws through, and we usually consider them leaf eaters, and, while this is true to some extent, yet they are really pollen eaters and prefer the bloom to the foliage. We know how destructive *12-punctata* and *vittata* are to the young Cucurbs, but as soon as the blossoms appear they largely forsake the leaves and frequent only the flowers, the former I have observed in the woods in October, feeding on the belated bloom of *Aster sagittifolius*, after the Cucurbs had been killed by frost; the adults are probably no more leaf eaters, in general, than they are fruit eaters. I have myself found *vittata*, *12-punctata* and *longicornis* feeding upon ripe apples, melons, squashes and pumpkins, and, too, have observed them all feeding upon the silk and pollen of corn. All three of them are found on the Golden Rod (*Solidago*), Wild Sunflower (*Helianthus*), and I always captured *atripennis* var. *fossata* on the bloom of the Compass Plant (*Silphium*), and the fondness of *longicornis* for the blossoms of thistle has long been observed as a marked characteristic, and we know that they forsake the cornfields as soon as the supply of pollen fails and the silk turns to brown. Mr. Charles Robertson, in his admirable series of papers in the Botanical Gazette on "Flowers and Insects," gives the following as frequented by *12-punctata: Nelumbo lutea, Impatiens fulva, Ceanothus americanus, Amorpha canescens, Œno-*

frequenting the blossoms of *Yucca whipplei*, while Koebele states that it is destructively abundant on many fruits and vegetables and that he has observed it feeding upon the leaves of young corn, the larvæ having been found by him attacking the roots. From all of the foregoing it will be seen that while the members of this genus in our country feed upon both fruit and foliage, it is the bloom to which they pay particular attention as soon as it is accessible to them. Still, it must be admitted that while *longicornis* has a fondness for the bloom of the cotton plant, yet it can hardly be said to occur in the cotton-growing portion of the country, and I can only suggest that it is primarily a grass insect, feeding in the larval stage upon the roots, and, largely at least, in the adult state on the blossoms of various flowers. Both Schwarz and Lugger have found pupæ of *12-punctata* about the roots of *Rudbeckia*, and Marten found the larvæ among the roots of *Cyperus strigosus* and *Scirpus fluviatellus*, while I have taken the supposed larva of this species feeding on young wheat plants below ground. We only know that the larvæ of *vittata* has been found in the roots of Cucurbs, which does not necessarily imply that it too may not breed among the roots of grass or plants of a kindred nature. The two species, *vittata* and *12-punctata*, appeared to have occupied the country to the east of the Rocky Mountains from an early day, as we hear of their depredations from the earliest settlement of the country, and we may fairly assume that both may have spread over the country from the southwest, supporting themselves in both the larval and adult stages upon the indigenous vegetation, though we can, of course, not say that the cultivated fields of both the Aztecs of Mexico and our own aborigines have not aided in their diffusion. Much less do we know or shall we be able to learn the influence that might have been offered by that extinct race of men, now only known by their stupendous earthworks that are scattered over the country, but of whose daily lives we know absolutely nothing, and therefore cannot measure their influence on the flora and fauna of their time. All facts now in our possession indicate that *longicornis* has spread eastward at a comparatively recent time, and though we only know of one food plant, corn, it is almost certain that there are others. Mr. Reinecke writes me that he collects all of his specimens of the beetle from willows growing near a small stream, not far from Buffalo, while Mr. Harrington calls attention to the lack of corn in the vicinity of where he found these beetles in New Brunswick, and states that the species must breed in the roots of some of the larger grasses. So far as known then, with the possible exception of *vittata*, the species shows a tendency toward the grasses as food plants for the larvæ.

The fact that several species of this genus are literally swarming over large areas of country, and their habits are such as to expose them almost continually during the adult stage to attacks of birds, while in all of the investigations of the food of birds they rarely appear, has raised the question of their being inedible. The colors of our commonest species are black, black and yellow, and green. It is true that a majority of the blossoms frequented by these beetles are more or less of a yellow color, but the black stripes and spots on some species and the almost entire black of others rather leads to the inference that black is in this case a warning and not a protective color. Or, in other words, while the colors of some of our species might be supposed to be protective, their coloration appears to be so only so far as warning colors can be said to constitute protection. The color of *D. longicornis*, being as it is of a uniform green color, or at most but slightly tinged with yellow, would form a protection, provided it fed upon foliage of the same color—but it does not; and its green color only makes it the more conspicuous on the purple bloom of the thistle, or the yellow flowers of the *Solidago*. If *12-punctata*, *soror* or *tricincta* habitually fed upon a yellow background like, for instance, the rays of the flowers of *Helianthus*, and should puncture them with small holes that would at a short distance resemble small black spots, then these species might be supposed to gain protection from their coleration. But neither these or *longicornis* are seemingly in the least protected by their coloration, and their immunity from attacks of birds must be due to other influences. Bates, in his "Naturalist on the River Amazon," states that in the forests along the Amazons "the Eumolopidæ and Galerucidæ were much more numerous than the Chlamydes and Lamprosomas, although being also leaf eaters and having neither the disguised appearance of the one trations are given of ten of these cases of mimetic resemblances, and it must be confessed that Mr. Gahan has made out an extremely strong point. But one of our North American species of *Diabrotica* is included in this list, *D. vittata*, which is given as the protector of *Lema nigrovittata*. I have strongly suspected this of our *Diabrotica* for several years, but the only case that appeared to me at all probable was that of our *Cerotoma caminea*, some of the collorial forms of which resemble *D 12-punctata*. But Mr. Gahan in his list gives *C. arcuata* as being mimicked by *Lema crucifera*, in Cayenne, which if correct, as I am inclined to believe, would render any such relation impossible. Of our seventeen species and varieties of *Lema*, as included in Henshaw's list, I have compared ten with an equal number of our eighteen species of *Diabrotica*, but shall be obliged to confess that among our North American species of these genera there does not appear to be any mimetic resemblances whatever, at least so far as my comparisons have carried me.*

Mr. Gahan, with commendable candor, freely admits that fresh observations of the species of the genera *Lema* and *Diabrotica* in their living stage will have to be made before it can be definitely established that the resemblances between them are cases of true mimicry. When this has been done, whether we find similar relationships existing among our North American species or not, we shall have ample proof of the inedibility of the species of *Diabrotica* and thus solved the problem of their protection from attacks of birds, as indicated by the great number of examinations made of the food of many of the most common of our species.

In conclusion, it would seem as though Central America, Mexico and possibly southern Arizona, southern New Mexico, and perhaps also southern Texas, comprised the womb, as it were, within which our North American species of *Diabrotica* had been formed and from out of which they had issued. And may it not be possible for the careful student, located within these boundaries, to still witness in Prof. Cockerell's *incerta*, variety of *D. vittata*, LeConte's *tenella*, variety of *12-punctata*, Harold's *12-notata* or some of the variations of *atripennis*, the actual evolution of species? A study of this genus of beetles over the area indicated will certainly richly reward the student, and not unlikely bring to light some facts that will prove of immense value to the science of biology in general.

***This statement has since been verified by examinations of these genera as represented in the National Museum at Washington and the Philadelphia Academy of Science.**

One point more and I am done. Without intending the least disrespect for that veteran worker, Dr. Horn, I wish to say that the distribution of species as usually indicated by him in his writings, and for which collectors are doubtless largely responsible, are almost valueless in studies of this sort, and I wish to emphasize in the strongest manner possible the point made by Mr. L. O. Howard, in his paper on the "Geographical distribution within the United States of certain insects injuring cultivated crops," where the plea was made for an *exact* record of the occurrence of a species—for exact localities, instead of sections of country or States.

FINAL NOTE ON THE PLATYPTERYGIDÆ.

By A. RADCLIFFE GROTE, A. M.

I refer to my paper on this family Can. Ent. XXVII, 133, and wish here briefly to draw attention to what seems to me the true position of our single American species referred to *Platypteryx*, according to Neumœgen and Dyar's arrangement, although I had supposed we had three: *siculifer*, *arcuata*, *genicula*. It may well be these names only apply to races or forms of a single species: *arcuata*. I take it for granted that my argument as to the proper name for the family cannot be gainsaid. Before any idea had been expressed in literature that the genus represented a family, Hübner had fixed the type of *Platypteryx* in the Tentamen and pleuralized the name (Platypterices), using it for the group afterwards in the Verzeichniss (1818). Stephens adopted this name for the group in 1829, changing the termination to follow Swainson's rule (1827) for families, calling it Platyptericidæ.

of these three left by Hübner's action open to our choice, viz.: *lacertinaria* (*Falcaria*), *glaucata* (*Cilix*), *flexula* (*Aventia*). From this work and the study of the material in the Roemer Museum, there seems to me to be two generic types passing usually indifferently under the names either of Schrank or of Laspeyres. One of these two should be available for *Drepana*. I quote the work for the characters:

A. Hind tibiæ with two pair of spurs. Antennæ * of the ♀ with saw-like teeth or notched.

The species are: *cultraria*, *binaria* (*hamula*), *harpagula*. To this section therefore the term *Platypteryx* irrevocably applies. Of the species I have not yet seen the last named.

B. Hind tibiæ only with terminal spurs. Antennæ of the ♀ shortly pectinate.

The species are: *falcataria*, *curvatula*. I have *falcataria* before me, and it is to this type that we may limit *Drepana*, if, in order to use this earliest name for some member of the group, we would not disturb any one of the three genera above indicated. I believe the characters to be of generic value. It is to this genus that our American species belongs, since it appears to "represent" the European *falcataria*; its correct title is therefore: *Drepana arcuata* Wlk. *Platypteryx* is then not yet found in America.

◆

A NEW DATANA.

BY HARRISON G. DYAR.

Datana chiriquensis, sp. nov.—Allied to *integerrima* G. & R., but larger and without the pale shades bordering the transverse lines.

Light brown, the fore wings thickly and evenly irrorate with dark brown scales; lines and fringe concolorous, dark brown. Transverse anterior line regularly arcuate, distinct; transverse median line also distinct, crossing the cell between the discal spots; transverse posterior line distinct, nearly straight, slightly incurved at vein 1 and at costal edge; between median and t. p. lines three faint lines (forming one more line than in the United States species), quite regularly spaced; apical streak dislocated, obscure. Discal spots pulverulent, dark, the outer narrow, moderate, the inner obsolescent, much as in *integerrima*. Costal portion of the wing scarcely brighter than the rest. Exterior margin entire. Secondaries brown outwardly, pale toward base. Thorax normal. Expanse 60 mm.

Types two ♀ ♀, Chiriqui, Mexico. (Heyde).

---

* Note Speyer's use of characters drawn from the female antennæ for taxonomic purposes and the implication of their value. The character given by Speyer, drawn from the hind tibiæ, is one used in the *Geometridæ*, and its use here indicates that there is a true relationship between the families as expressed by Dyar's classification.

SCHRANK'S GENERA.

By A. RADCLIFFE GROTE, A. M.

Before discussing Schrank's genera, mainly those referrable to the Agrotidæ, I wish to state the case of the Tentamen and give the date which we may accord to it. The Tentamen is of the utmost value to the nomenclator. Alone by this sheet can we trace the origin of certain generic names now in use and fix their types. Such are: *Diphthera*, *Polia*, *Agrotis*, *Plusia*, *Brephos* and others. The type, for instance, of *Agrotis* is *segetum*, and in this sense the term is now used, after I had pointed out the true type; but for this type we are indebted to the Tentamen. From the mixed character of Ochsenheimer's genera and subsequent authorities, including Boisduval, it would be difficult to find the type of *Agrotis*, and perhaps, without the Tentamen, our researches might lead us wide away. All this disturbance the Tentamen saves us, and its "catalogue genera" are besides the first attempt to arrange the Order in the spirit of modern enquiry. It is the same with *Plusia*; the Tentamen gives us the name and the type: *chrysitis*, and thus fixes for us the group to which the name is referable. This genus is next on the list for disintegration. We have in it at least two types which classificators must hold fast and be thankful for: *chrysitis* and *gamma*. When we see how gladly, upon the same principle of priority, Prof. J. B. Smith sweeps away generic titles, held for twenty-five years in America, to reinstate names of Walker's, whose correct application is, from the state of the case, doubtful, and even sometimes impossible, we feel some amazement at the prejudice against Hübner's titles. It may have some-twenty times as disturbing and doubtful.] Ochsenheimer gives us this certainty, and, in my preface to the 2d part of the Buffalo Check List, I give Ochsenheimer's words, published in 1816, that the Tentamen only came into this writer's hands long after his third volume (1810) was printed, therefore he could not have used anything out of the Tentamen at an earlier date (than 1816.) And in 1816 Ochsenheimer uses the Tentamen names, and this settles the fact that the Tentamen was known in 1816 and used and useful. The fact is further settled that Ochsenheimer did not have the Tentamen in 1810. Now, when did he get it? The words used by him: "*daher konnte ich früher nichts davon aufnehmen,*" would seem to imply that if he *had* received it earlier (*frueher*), he would have used it; *i. e.*, in his third volume, 1810; and this construction favors Scudder's date of 1806. In fact, the whole of Ochsenheimer's remarks, p. viii, vol. iv, produce the effect that Ochsenheimer favorably considered the Tentamen; as a whole, regarded it as an equal authority, and, had he thought it necessary, might have ascertained and given its exact date. Whether he knew it or not does not appear. This he does not do, but, in the course of his volume, he uses in the groups he there catalogues the following names, crediting Hübner; Ochsenheimer gives (*supra*) the full title of the Tentamen, so that there is no doubt of his citing this publication. Lemoniades (for or under *Melitæa*), Dryades (for or under *Argynnis*), Limnades (*Euplœa*), Hamadryades (*Vanessa*), Najades *Limenitis*, Potamides (*Apatura*), Oreades (*Hipparchia*), Rustici (*Lycæna*), Principes (*Papilio*), Mancipia (*Pontia*), Urbani (*Hesperia*). So much for the butterflies. Ochsenheimer uses the plural names out of the Tentamen in the synonymy, the names formed out of the generic title; and hence for assemblages, as I understand Hübner, who uses in the Verzeichniss these very names in this sense as higher than genera. It makes no difference that Ochsenheimer makes them synonyms; what is in the synonymy may one day obtain. The point is the recognition of the Tentamen. In the Agrotidæ and Apatelidæ Ochsenheimer cites Hübner, and gives priority to the following names: *Diphthera* (p. 63), *Agrotis* (p. 66), *Graphiphora* (p. 68), *Miselia* (p. 72), *Polia* (p. 75), *Xanthia* (p. 82), *Cosmia* (p. 84), *Xylina* (p. 85), *Plusia* (p. 89), *Heliothis* (p 91), *Anthophila* (p. 93), *Brephos* (p. 96), *Euclidia* (p. 96). Now I would like to know what the critics have to say to this recognition of the Tentamen? In other cases in these families Ochsenheimer conscientiously cites the Tentamen names, but refers them to the synonymy. It is clear why he does so in some cases, not clear in others.

Clear when he gives *Jaspidia* as a synonym of *Pœcilia*, not clear when he cites *Heliophila* as a synonym of *Leucania*. All these names must be restored to Hübner and their use in the Tentamen confers the inestimable benefit that we are given their exact types. Hübner, in the Tentamen, does not seem to know of Schrank's Fauna Boica; in the Verzeichniss he uses some of the names.

It is, then, certain, that in 1816 Ochsenheimer adopts the Tentamen; certain, that he says he received it long after his third volume, in 1810, was published. These are the two sure points. It is certain also, that Hübner makes the Tentamen the basis of the Verzeichniss; although he changes the generic titles (*coitus* H.), he uses the higher divisions (*stirps* H.) of the Tentamen. Now the Verzeichniss is later than 1816, from internal evidence, and we give therefore Ochsenheimer's fourth volume the due priority (see Scudder's argument). I give, once for all, 1818 as the date of the Verzeichniss, in order to show this position of the two works and to abate the query in citations and again because, having given Ochsenheimer's fourth volume the *pas*, there is no other work with which the Verzeichniss collides, even if we admit the full dates of the signatures as assigned by Scudder. As to the Agrotidæ (see my Bremen list of 1895) it seems probable that the date of these signatures may be earlier than Scudder supposes, say certainly 1822, as compared with the Zutraege. It must be remembered that the law of priority, at least as to genera, was then, as even now, loosely applied, as compared with its use to species. Subjective notions are freely displayed by writers in dealing with genera, even nowadays, from Boisduval and Guenée on. They consider themselves superior to Hübner, and some, in fact, to all creation. Now, holding these points fast, I ner and Ochsenheimer. For there is then no vital conflict left; so far as my researches go there are but two or three corrections necessary in the Agrotidæ, where Ochsenheimer has rejected a few names without apparent reason. He adopts far more than he rejects, and the rejections arise from special causes, in the main, to be studied out by the systematist and nomenclator. All ground for radical disputes would be taken away by this course. There is no reason why we should be be better than Ochsenheimer in his fourth volume, and take a different stand as to Hübner. Above all we secure to the nomenclator the great benefit of the undisputed use of the Tentamen in ascertaining the true origin of many names in use and the unfailing designation of their types.

We may now consider certain of Schrank's genera, all those of the Agrotidæ, and a few of the others. They date from 1802; the species are described in Vol. I, 1801.

Saturnia.

1802. Schrank, Faun. Boic. II, 149.—*Pyri, spini, carpini, tau.*

1810. Ochsenheimer, Schm. Europ. III, 1.—*Pyri spini, carpini.* [This restriction of Ochsenheimer's, is that to-day adopted. *Heæra* Tentamen 1811, for *carpini* (*Pavonia minor*) becomes a synonym, in the absence of character.]

1895. Grote, Syst. Lep. Hild.—Designates *pyri* (*Pavonia major L.*) as type.

Bombyx.

1802. Schrank, Faun. Boic. II, 150.—*Mori, versicolor.* [This restriction of the Linnean genus *Bombyx* is important, because it fixes the type as *mori*, through Ochsenheimer's erection of the genus *Endromis* for *versicolor*, 1810, III, 15. The generic title *Bombyx* has, then, been misapplied to the Lachneidæ by authors, and its use in Staudinger's Catalogue must be abandoned. I am therefore correct in designating *mori*, which was virtually the type since 1810.]

Pœcilia.

1802. Schrank, Faun. Boic. II, 157.—*Perla, aprilina, runica.* [The name falls because preoccupied.]

Cucullia.

1802. Schrank, Faun. Boic. II, 157.—[Refers here his families G & H, I, 325 et seg.] Fam. G: *artemisia, abrotani, absynthii, verbasci,* *tanaceti*, *scrophulariæ*, *linariæ*, *lactucæ*, *umbratica*. [It is to this "family," that the generic term must be applied and the type sought, since Schrank's translation of the term: "Mönchseule," and his reference to the hooded collar sufficiently indicate his purpose which falls in with the modern use of the term.] Fam. H: *exsoleta*, *petrificata*, *margodea*, *putris rhizolitha*, *perspicillaris*.

1816. Ochsenheimer, Schm. Eur. IV, 87.—*Spectabilis*, *gnaphalii*, *abrotani*, *absinthii*, *artemisiæ*, *argentina*, *lactea tanaceti*, *dracunculi*, *umbratica*, *chamomillæ*, *lactucæ*, *lucifuga*, *asteris*, *verbasci*, *scrophulariæ*. [This restriction accords with the above statement, that a "hooded owlet" must be the type of *Cucullia*. *Tribonophora* Hubn. 1811 (type: *umbratica*) is referred by Ochsenheimer as a synonym.]

1818. Hübner, Verzeichniss, 246.—*verbasci*, *scrophulariæ*. [This restriction is most useful and enables us to fix the type; which is one of the group with uneven fringes.]

1874. Grote, List N. Am. Noct. 28.—Designates *verbasci* as type.

Hadena.

1802. Schrank, Faun. Boic. II, 158.—[Refers here his "familes"] M. and N., I, 348 et seg., and translates his term by: Trübeule. Fam. M.; *typica*, *chenopodii*, *atriplicis*, *præcox*, *pisi*, *oleracea*, *hordei*, (*deaurata*), *xanthographa*, *piniperda*. Fam. N.: *lucipara*, *cucubali*.

1816. Ochsenheimer, Schm. Eur. IV, 71, cites *Hadena* Schrank and includes 28 species, fully as dissonant as Schrank's material, some with hairy, some with naked eyes. But he excludes every species cited under Schrank's family M, and includes both *lucipara* and *cucubali* with Schrank's family N, thus restricting the genus in this sense.

Catocala.

1802. Schrank, Faun. Boic. II, 158. [Refers here his "family" V, I, 364, and translates his generic term by: Prachteule.] Fam. V: *maura*, *fraxini*, *nupta*, *pacta*, *conjuncta*, *elocata*, *sponsa*, *promissa*, *paranympha*, *parthenias*, *puella*. [It thus contains the types of *Catocala*, *Mania* and *Brephos*. But, as with *Cucullia*, though with somewhat less clearness, we must seek the type within the limits of the modern genus, a species of which seems meant as typical by Schrank, though here, as elsewhere, no "type" is indicated.]

1816. Ochsenheimer. Schm. Eur. IV, 94.—[Restricts the term in consonance with the above idea.] *Fraxini* and 16 other species all referable here, the entire European species, and refers also *Blephara* (*Blepharum*) Hübn. Tent. 1811, 2, as synonymous. [The type of *Blepharum* is *sponsa* and the course of Ochsenheimer should be followed from general considerations.]

1818. Hübner, Verzeichniss, 276, (*Catocalla*). *Fraxini*, sole species and therefore type.

1874. Grote, List N. Am. Noct. 41.—Designates *fraxini* as type. [Since Hübner, in the Tentamen 1811, proposes names for the three original types contained in *Catocala* Schrank: *Lemur maura*, *Blepharum sponsa*, *Brephos parthenias*, Ochsenheimer is justified in taking one for the original genus and his choice is approved by Schrank's manifest intentions. Whether *sponsa* or *fraxini* becomes the type of *Catocala*, may perhaps be disputed. I follow Hübner's Verzeichmiss, rather than the indication of the Tentamen, for the sake of greater clearness and because it seems unessential of Hübner's three names, *Lemur* is preoccupied, *Blepharum* a synonym and *Brephos* remains valid.]

Pyrausta.

1802. Schrank, Faun. Boic. II, 163.—*Cingulalis*, *lemnalis*. [*Cingulalis* may be taken as type and this will conform with the use of the term by Prof. Fernald.]

Agrotera.

1802. Schrank, Faun. Boic. II, 163.—*Nemoralis*, sole species and therefore type.

Pyralis.

1802. Schrank, Faun. Boic. II, 162.—*Pinguinalis*, sole species, and this restriction apparently makes *pinguinalis* the type of the Linnean genus. [*Aglossa* Latr. would be synonymous with *Pyralis* under his restriction.]

Polypogon.

1802. Schrank, Faun. Boic. II, 162.—*Barbalis*, *tentaculalis*. [*Tentaculalis* should be taken as type from subsequent restrictions. The name appears to have been neglected and is perhaps not available. See *Erpyzon*.]

Hypena.

1802. Schrank, Faun. Boic. II, 163.—*Proboscidalis*, *rostralis*, *palpalis*.

1818. Hübner, Verzeichniss, 345.—*Palpalis*, *decimalis*, *obsitalis*, *rostralis*. [Excludes *proboscidalis*, leaving the term for either *rostralis* or *palpalis*.]

1874. Grote, List N. Am. Noct. 52.—Designates *rostralis* as type. The term seems to have been taken by Schrank from Fabricius, but the latter is not apparently quoted.

Scopula.

1802. Schrank, Faun. Boic. II, 162.—*Paludalis*, *dentalis*.

Nymphula.

1802. Schrank, Faun. Boic. II, 162.—*Potomagalis*, *nymphæalis*. [I may leave the designation of the type in those two genera to my friend, Prof. Fernald.]

Erpyzon.

1811. Hübner, Tentamen, 2.—*Barbalis*, sole species and therefore type. [This name appears neglected and, instead, *Pechipogon* Hübn., Verz., is used by European authorities, such as Staud. Catalog, Hoffman, etc. Now *Pechipogon* is used in the Verzeichniss for *plumigeralis* (*barbalis* Hübn. Pyr. 18) and *pectitalis* Hübn. Pyr. 122. *Bar-*

yet started by means of "Butterfly Books." I would appeal to every thinking lepidopterist to discountenance the use of erroneous generic names such as *Acronycta*, *Xylina*, *Erastria*, *Tæniocampa*, in order to spare future students from the necessity of a more troublesome change. It has come to such a pass in Europe that the names for genera are largely wrong, and that in England one set of names (Guenée's in the main) are used, on the Continent another (Lederer's in the main). I have made the effort from the first, and as soon as I saw (1873–4) that the nomenclature was improperly founded, to restore the proper generic titles. A heavy responsibility rests on those who, unable to furnish any but subjective and erroneous arguments, try to overturn this work. For it must ultimately obtain, but not, perhaps, until the wrong names have permeated literature and produced confusion. The authors of this confusion are then Messrs. Lintner, Smith and their followers, and time will place them in this position if they persist. But it is yet time. Nothing but the most tentative work has yet been published on these families. The species have been barely covered with titles. All the "Revisions" are so faulty in almost every respect that they will soon be revised. Let us then clear the track of wrong generic titles and refuse to enter into the inheritance which modern European literature offers us. Each genus must have its exact type, and the oldest generic names, irrespective of persons, must prevail.

◆

EARLY STAGES OF SOME BOMBYCINE CATERPILLARS.

By A. S. PACKARD.

The following observations were made during the summer of 1894, and I desire to express my indebtedness to Mr. William Dearden, of Providence, who kindly furnished me with the eggs of certain of the species.

Perophora melsheimerii.

The eggs were received from Mr. H. Meeske, of Brooklyn; they hatched in Providence, R. I., June 21, 22.

Larva, Stage I.—Length 3 mm. Head and prothoracic shield of the same width, being as wide as the body in front, which slightly tapers toward the end from the middle of the body; they (head and shield) are dark pitchy blackish chestnut, and the surface rough. The body is dark chestnut brown, behind a little paler, and beneath paler. The antennæ are long and blackish-brown, as are the thoracic legs. The sides of the abdominal segment are swollen, and the segments appear as if frosted over, the skin being rough as if shagreened with fine white granulations. There are faint traces of a slight dorsal line on the posterior half of the abdominal region.

In a few days, nearly a week, after hatching, a median yellowish dorsal line becomes distinct.

When first beginning to feed after hatching it simply loosely fastens two leaves together with silk threads, and feeds like a Tineid larva, not making a case. The specimens died before molting.

Clemensia albata.

The eggs were sent me from Providence July 26, by Mr. Dearden. They hatched at Brunswick, Maine, Aug. 8, in the morning. The food plant is unknown ; the larvæ would not eat willow, poplar or lichens. The eggs are oval, covered with white hair and are laid in groups of five or six.

Larva, Stage I.—Length 1.8 mm. Head a little wider than the body, the vertex convex on each side, the two halves of the epicranium being like two contiguous orbicular pieces, and dark, dusky amber in color, the head in front, lower down, paler. Body moderately long, cylindrical, the segments unusually convex, whitish greenish in front. The hairs, which arise from minute one-haired tubercles, are of nearly uniform length on the back and sides of the body; they are two-thirds as long as the segments are thick, finely spinulate.

Hypercompa fucosa.

Larva, Stage I.—The larvæ when first hatched were almost undistinguishable from those of *Spilosoma congrua*, which hatched at the same date. The head is wider than the body, which is quite hairy and white. The head is pale amber with two brown spots on each side, or rather, nearly all are pale horn-brown. The tubercles all bear but a single hair, and are as long as the body is thick. It molted July 11.

Stage II.—Length at first 4 mm. Now the body is of the same general shape as before, but the head is black and the tubercles are black. The prothoracic plate is divided, and the other dorsal and lateral tubercles give rise to from five to six short black hairs, with some white ones.

Stage III.—(Described July 21–22). Length 7 mm. Body whitish with black tubercles and hairs much as before. There are now two faint straw yellow broad lateral bands extending down to the base of the abdominal legs. Also a double row of subdorsal dark brown spots on each side of the back, at the sutures, the central part of each segment being clear of markings.

August 14. The body is now 12 mm. in length, and above is much blacker; the straw yellow band on the side being now very conspicuous. The tubercles are dark metallic blue, and there are four dorsal black bands on a livid ground. It molted August 14.

Stage IV.—Length 12 mm. The body is now entirely black, with metallic blue tubercles; the hairs are of unequal length and black. There is a lateral row of straw yellow spots, the continuous band of the previous stage being broken in the middle of each segment. It is now a very handsome caterpillar. It molted September 1.

Stage V.—Length 14 mm. It has the same markings as in the previous stage, and the only difference is a slight increase in size.

Stage VI.—It molted again September 12–15, but presented no difference either in markings or size.

Spilosoma congrua.

The eggs were received from Mr. Dearden June 27. The larva had in part hatched and were hatching June 30.

Larva, Stage I.—Body at first white except two dark spots on the head, but in a few minutes the latter became dark. Head wider than the body. The setiferous chitinous plates or flattened tubercles dusky and contrasting with the white body. Prothoracic plate divided. Under a ½ inch objective the dorsal and lateral tubercles of the abdominal segments bear but a single hair, which is finely spinulate, and as long as the body is thick.

Arctia anna (persephone).

The eggs were deposited by a female, collected June 11, and sent me by Mr. Dearden. I identified the moth from the Edwards collection in the American Museum of Natural History, New York. The eggs hatched about July 10 or 12. The female had a broad black margin on the hind wings, and a discal crescentiform spot, otherwise it was normal. Stage I was described July 13.

Larva, Stage I.—Length 2 mm. Body of the usual shape. Head dull amber, with two dusky spots on the vertex. Tubercles dark chestnut brown, those of the four dorsal rows of the abdominal segments bearing two setæ; the other tubercles, *i. e.*, those of the two lower rows, 1-haired. The hairs all dark, spinulate, about one-third as long as the whole body. The prothoracic plate is crescentiform. Thoracic legs amber-colored. It molted July 30, 31.

Stage II.—Length 6.5 mm. The tubercles now bear from 8 to 10 black setæ. Body pale; the large dorsal tubercles black, with minute black non-setiferous ones in front near the front edge of each abdominal segment. Lateral tubercles pale, of the color of the body, but with black setæ. Prothoracic shield small, dark, not conspicuous. Two long black hairs project beyond the others from the end of the body, and two similar ones from the side of the 8th abdominal segment. Head dark chestnut above, in front pale. Ground color of the body greenish, the tubercles yellowish. Thoracic and abdominal legs pale.

August 8th, it had not molted; length 10 mm. Now all the tubercles are black, and the skin is livid, with faint traces of two dorsal lines between the two rows of large dorsal tubercles, the lines enclosing the minute anterior tubercles.

After second molt, August 14. Length 10 mm. The body is now and rather large. The two median tubercles are minute, and the two subdorsal ones large. The two rows of small dorsal tubercles one-haired; those of the subdorsal row (or 3d row from below of the abdominal segments with legs) bearing each two hairs; the second dorsal row of 2d and 3d thoracic segments bearing each two hairs, but the next row beneath with one on the segments provided with legs. Hairs nearly twice as long as the body is thick; the dorsal hairs black and the lateral ones grayish. Thoracic legs dark amber brown. Abdominal legs amber, with an external dark piece. A distinct subcrescentiform dark conspicuous prothoracic plate. It molted July 7–8.

Stage II.—Length 6 mm. Head black. Dorsal tubercles black, with from ten to twelve black spinulated hairs. A dorsal median row of whitish spots beginning on the second thoracic segment, and a similar subdorsal line. The lateral tubercles dusky amber colored. The general hue of the skin dark amber. Prothoracic plate not very large, with dark dorsal tubercles. It molted July 10.

Stage III.—Length 7 mm. Head black, shining, not so wide as the body. The body now uniformly, with all the tubercles, shining black. A conspicuous median dorsal white band, the spots separate in stage II, being now smaller in proportion and connected, beginning as before on the 2d thoracic segment. A faint dark livid subdorsal line, at first not visible. About twelve spinulated pairs arise from the dorsal tubercles, and, like those of the others are all black, except an occasional small white one. It molted again July 17.

Stage IV.—Length 10 mm. Much as before though thicker, the body entirely black, with a whitish dorsal stripe; no definite subdorsal line, but the sides of the body between the tubercles are dull livid, the livid band enclosing three rows of tubercles, *i. e.*, the 2d, 3d and 4th from the dorso-median one.

July 21, it was 15 mm. long, though it had apparently not molted.

July 22, the pale subdorsal lateral band is whiter than before; this band extends underneath around the body, enclosing four rows of tubercles on each side, thus making a broad black band on each side of the median dorsal line. It molted July 25.

Stage V.—Length 15–16 mm. It is now deep black; the dorsal stripe now distinctly whitish yellow and narrow, with a broad black band on each side. The sides of the body are darker livid than before, the livid hue less apparent. The upper row of subdorsal tubercles are pale, shining, glistening at the end, and black below. Thoracic legs black; abdominal legs pale. It molted again July 31.

Stage VI.—Length 16–17 mm. Same as in stage V; described August 1st. The three lateral rows of tubercles are now dull amber brown, and of the same hue as the abdominal legs. It molted again August 15.

Stage VII.—Length 20–22 mm. Of the same appearance as before but the three rows of dorsal and subdorsal tubercles on each side are pale whitish clay color; the dorsal median hue is conspicuous, being yellow as before.

PRELIMINARY HAND-BOOK OF THE COLEOPTERA OF NORTH EASTERN AMERICA. *

(Continued from page 76.)

By H. F. WICKHAM.

Myas *Dej.*

With most of the characters of *Pterostichus* this genus differs by having the terminal joint of the palpi dilated. There are no dorsal punctures. Two North American species are known which separate thus:

Synopsis of Species.

Larger, elytral striæ punctured..**coracinus.**
Smaller, elytral striæ not or very obsoletely punctured..............**cyanescens.**

M. coracinus *Say.*—Black, elytra purplish; thorax large, trans-

Pterostichus *Bon.*

Antennal grooves wanting beneath, two supra-orbital setæ, scrobe of mandible without setigerous puncture. Hind coxæ contiguous, margin of elytra with postero-lateral interruption, three basal joints of antennæ smooth, head not greatly constricted behind the eyes. Terminal joint of labial palpi not dilated and not shorter than the penultimate which is bisetose anteriorly. Anterior tarsi of ♂ transversely dilated.

Usually black shining species, sometimes with metallic or purplish luster. Form elongate, more or less depressed. They are common in woods under logs, stones or leaves, while many are to be found in the spring under all kinds of shelter. From its great size the genus is quite difficult to handle. The essentials used in the following table are in the main those suggested by Dr. LeConte, whose papers have been freely used.

Synopsis of Species.

Dorsal punctures wanting..2
Dorsal puncture single..5
Dorsal punctures two or more..11
2. Head of moderate size..3
Head greatly enlarged..4
3. Prosternum margined at tip..**congestus.**
Prosternum not margined at tip..**adoxus.**
4. Hind trochanters acute at tip..**grandiceps.**
Hind trochanters rounded at tip..**rostratus.**
5. Basal foveæ of prothorax double or bistriate..6
Basal foveæ of thorax single..9
6. Hind angles rectangular, longer and prominent..7
Hind angles subobtuse or very small..8
7. Legs black anterior transverse thoracic line evident..**substriatus.**
Legs reddish transverse line obsolete or wanting..**incisus.**
8. Elytral striæ punctulate..**vinctus.**
Elytral striæ smooth..**apalachius.**
9. Hind angles of thorax rectangular, prominent. Elytral striæ deep, small species (.32 in.)..**honestus.**
Hind angles nearly rectangular, large species (.75 in.)..**unicolor.**
Hind angles rounded or obtuse..10
10. Larger (.75 in.) Elytral striæ very fine..**rotundatus.**
Smaller (.41 in.) Elytral striæ profound, thorax without anterior impressed line..**obsoletus.**
Small (.40 in.) Internal elytral striæ deep, thorax with deep anterior impressed line near margin..**approximatus.**

11. Last joint of palpi cylindrical, truncate at tip, mostly larger species 12
Last joint of palpi elongate oval, scarcely truncate, smaller species.......... 38
12. Metathoracic episterna short.............................. 13
Metathoracic episterna long.. 25
13. Prosternum not margined behind 14
Prosternum margined, thorax broader posteriorly.......................... 24
14. Outer striæ of elytra finer; prothoracic margin fine........................ 15
Outer striæ of elytra nearly or quite as deep as inner 16
15. Striæ of elytra smooth .... **obscurus.**
Striæ punctured .... **ventralis.**
16. Prothorax narrower behind... 17
Prothorax nearly quadrate, elytral striæ subcatenate....................... 22
Prothorax broader behind, elytral striæ normal.................. 23
17. Two dorsal punctures... 18
Four dorsal punctures... 21
18. Basal foveæ deep linear.................... ....**lachrymosus.**
Basal foveæ large, broad....................... 19
19. Hind angles carinate.. 20
Hind angles not carinate, fovea not tuberculate.................. **relictus.**
20. Fovea not tuberculate.. **coracinus.**
Fovea with tubercle .... **stygicus.**
21. Purplish, hind angles carinate........................... **superciliosus.**
Dull black, hind angles not carinate.............................. **mœstus.**
22. Basal foveæ broad, deep, punctured, thoracic margin broader at base, hind angles obtuse .... **punctatissimus.**
23. Side margin and basal foveæ punctured...................... **sculptus.**
Side margin and basal foveæ not punctured........................ **fallax.**
24. Above iridescent, thorax flattened, narrowed anteriorly.......... **permundus.**
Above black, thorax convex more quadrate.................... **hamiltoni.**
25. Basal joints of antennæ distinctly carinate................................ 26
Basal joints of antennæ simple.......... 27
26. Legs black; above green, polished dorsal punctures two, body beneath

Basal foveæ punctulate, elytral striæ deeper........................**caudicalis.**
31. Larger species (.60 in.) less slender...............................**corvinus.**
Smaller species (.38 in.)......................................**luctuosus.**
32. Ligula obtusely carinate, thorax strongly margined.........................33
Ligula not carinate, thorax very finely margined......................35
33. Hind thoracic angles obtuse, elytra ♂ dull.......................**gravis.**
Hind angles rectangular..34
34. Very brilliant (♂, ♀). Middle tibiæ ♂ with acute subapical tooth and feeble obtuse apical process....................................**scrutator.**
Moderately brilliant (♂) or duller (♀); sides of thorax distinctly sinuate behind..**tartaricus.**
Less brilliant, ♀ dull; thorax scarcely sinuate near base.........**haldemani.**
35. Purplish above, thoracic impressions not punctured.............**purpuratus.**
Black above, thoracic, impressions punctured.........................**mutus.**
36. Hind angles of thorax small, dentiform, elytra shining..... **pennsylvanicus.**
Hind angles rectangular, elytra ♀ dull ....**vitreus.**
Hind angles obtuse, elytra ♀ dull......................................37
37. Sides of prothorax broadly depressed............................**orinomum.**
Sides of prothorax narrowly depressed............................**luczotii.**
38. Metathoracic episterna long 39
Metathoracic episterna short..41
39. Scutellar stria long...40
Scutellar stria wanting, thorax nearly square, rounded at angles,color black, legs reddish...**erythropus.**
40. Elytral striæ smooth; antennæ and legs reddish..................**patruelis.**
Elytral striæ punctured in anterior half, antennæ and legs reddish, thighs usually darker...**femoralis.**
Elytral striæ obsoletely punctured, antennæ and legs bright ferruginous, surface iridescent...**corrusculus.**
41. Prothorax not margined at base near hind angles, scutellar stria long, elytral striæ fine, surface brassy..................................**vindicatus.**
Prothorax with base margined near hind angles..........................42
42. Outer basal fovea wanting...43
Both foveæ present, the outer one small.....................**hudsonicus.**
43. Medium-sized, hind angles of thorax more or less prominent.....**empetricola.**
Smaller, prothorax broader, more narrowed behind sides suddenly sinuate, hind angles prominent.....................................**mandibularis.**

P. congestus *Mén.*—Black, thorax longer than broad, narrowed and sinuate posteriorly, basal margin straight, not margined toward the sides. Elytral striæ deeper behind. Length, .47–.70 inch = 12–17.5 mm.

Habitat: Alaska, California (San Diego). The Wisconsin record, on the strength of which it is here inserted should be carefully verified.

P. adoxus *Say.*—Black, antennæ and palpi dark rufous, legs and abdomen piceous. Thorax gradually narrowed behind, sides excurved near hind angles, basal lines strong, elytral striæ not punctured. Length, .53–.60 in. = 13–15 mm.

Habitat: Canada to Georgia, west to Wisconsin and Wyoming.

P. grandiceps *Chaud.*—This and the following species are easily known from their allies by the very large head and prominent mandibles. Length, .56–.68 in. = 14–17 mm.

Habitat: Georgia, North Carolina and Tenn.

P. rostratus *Newm.* Pl. VII, fig. 3.—Length, .56–.67 in. = 14–16.3 mm.

Habitat: Canada, New York, south and westward.

P. substriatus *Lec.*—Black, shining, thorax broad, much narrowed behind and rounded on the sides. Striation of elytra variable, sometimes quite deep, often nearly effaced. Length, .48–.57 in. = 12–14 mm.

Habitat: New Jersey, New York, southward: Missouri to New Mexico.

P. incisus *Lec.*—Resembles the preceding, differs in the anterior transverse line of prothorax being nearly effaced, the legs reddish, the hind angles of prothorax smaller. Length, .40–.48 in. = 10–12 mm.

Habitat: Illinois, Missouri River to Colorado.

P. vinctus *Lec.*—Black, shining, thorax not transverse, anterior transverse line wanting, elytral striæ deep. Length, .43 in. = 11 mm.

Habitat: Georgia, Tennessee, Pennsylvania.

P. unicolor *Say.*—Black, opaque, thorax not transverse, sides subsinuate posteriorly, basal impressions single, rather long, elytra finely

P. apalachius *Horn.*—Blackish, shining, slightly iridescent, thorax about equal in length and breadth, slightly narrowed posteriorly. Body beneath smooth except for a few punctures on the sides of the sternum and anterior abdominal segments. The male has a broad oval excavation near the posterior margin of the anal segment. Length, .48 in. = 12 mm.

Habitat: Canada, New York, Illinois, Pennsylvania and Maryland.

P. honestus *Say.* Pl. VII, fig. 4.—A rather small and easily recognized species; the thorax is much narrowed and abruptly sinuate at sides behind, the elytra more oval than usual with very deep striæ and much broader than the thorax. Length, .32 in. = 8 mm.

Habitat: Widely distributed in the Eastern States, especially northward.

P. obscurus *Say.*—This and the following species are of a peculiar appearance, more elongate than usual, the second dorsal puncture situated in the third stria. The thorax is narrowed behind, trapezoidal in shape, the hind angles very obtuse, rounded. Length, .42 in. = 10.5 mm.

Habitat: Pennsylvania, Ohio, south and westward.

P. ventralis *Say.*—Separable from *obscurus* by the characters given in the table. Length, .35 in. = 9 mm.

Habitat: Louisiana, Florida, Missouri, Illinois and Kansas.

P. lachrymosus *Newm.*—Black, thorax much narrowed behind, elytral striæ deep, interstices convex. Length, .60 in. = 15 mm.

Habitat: New York, southward and westward.

P. coracinus *Newm.* Pl. VII, fig. 5.—Black, thorax quadrate somewhat narrowed behind, sides broadly rounded. Elytral striæ deep, impunctured. Length, .60–.70 in. = 15–17.5 mm.

Habitat: Canada and Wisconsin to Tennessee and Virginia.

P. stygicus *Say.*—The tubercle in the thoracic fovea easily distinguishes this from the preceding. Length, .57 in. = 14 mm.

Habitat: Canada to Illinois and Georgia.

P. relictus *Newm.* Sufficiently distinguished by the characters given in the table. Length, .64 in. = 16 mm.

Habitat: New York, Pennsylvania and Michigan.

P. superciliosus *Say.*—Black, shining, elytra purplish. Thorax wide in front, much narrower behind, hind angles broadly rounded. Elytral striæ deep, impunctured. Length, .60 in. = 15 mm.

Habitat: Michigan, Pennsylvania and New York.

P. mœstus *Say.*—Size of preceding, differs as noted in table.

Habitat: New York, New Jersey, Pennsylvania and West Virginia.

P. punctatissimus *Rand.*—Black, polished, thorax quadrate, but slightly narrowed behind, posterior angles obtuse. Elytral striæ deep, the alternate interstices interrupted and foveate. Length, .57 in. = 14 mm.

Habitat: Massachusetts, New Hampshire, Maine and Canada.

P. fallax *Dej.*—Body elliptical, polished. Elytra deeply striate, abdomen not punctured at sides. Length, .65 in. = 16 mm.

Habitat: Tennessee, Arkansas and southward.

P. sculptus *Lec.* Pl. VII, fig. 6.—Narrowed and more shining than *fallax*, abdomen punctured at sides. Length, .55–.70 in. = 14–17.5 mm.

Habitat: New York and southward.

P. permundus *Say.*—Elliptical, black, shining with iridescent reflections, elytral striæ very finely punctured. Length, .60 in. = 15 mm.

Habitat: Ohio, Indiana, Iowa, Missiouri, Illinois and Nebraska.

P. hamiltoni *Horn.*—Resembling *permundus* in general form but differs by characters given in table. Length, .54 in. =13.5 mm.

Habitat: Pennsylvania, East Ohio, Maryland and West Virginia.

P. sayi *Brullé.*—Usually bronzed above, sometimes nearly black. Body oblong, somewhat flattened, thorax narrowed anteriorly, hind angles rectangular, elytral striæ deep. Length, .40–.50 in. = 10–12.5 mm.

Habitat: Northeast America, abundant.

table for specific identification are those selected by Dr. LeConte. Length .44–.54 in. =11–13.5 mm.

Habitat: New York, Illinois, Louisiana, Texas and Ohio.

P. caudicalis *Say.*—Length, .41–.50 in. =10–12.5 mm.

Habitat: Canada to Maryland, Ohio, Dakota, Montana, Nevada and Oregon.

P. luctuosus *Dej.*—Smaller and more slender than the others of the group. Length, .37 in. =9 mm.

Habitat: Canada, Wisconsin, New York and Pennsylvania.

P. corvinus *Dej.*—Thorax rather short, sides not sinuate, hind angles very slightly prominent or subobtuse. Length, .57–.60 in. =14–15 mm.

Habitat: Canada to Wisconsin to Nebraska, New York to Georgia.

P. haldemani *Lec.*—Black, elytra opaque, at least in the ♀, striæ fine. A very large species. Length, .87 in. = 22 mm.

Habitat: New York and south to Alabama.

P. tartaricus *Say.* Pl. VII, fig. 8.—Aside from the characters given in the table, may be known from the preceding species by having deep elytral striæ. A specimen (♀) in my cabinet from Iowa City exceeds all the recorded measurements, reaching 24 mm. Length, .63–.96 in. = 16–24 mm.

Habitat: New York, Canada, south and west to Illinois and Iowa.

P. scrutator *Lec.*—Smaller and very brilliant. Length, .60 in. = 15 mm.

Habitat: Canada, New York, Illinois and Iowa.

P. gravis *Lec.*—Length, .76 in. = 19 mm.

Habitat: Pennsylvania, rare.

P. purpuratus *Lec.*—Purplish above, body rather elongate, thorax moderately narrowed behind. Posterior tarsi with three joints grooved. Elytral striæ deep, impunctured. Length, .53–.56 in. = 13–14 mm.

Habitat: New York to Pennsylvania and Ohio.

P. mutus *Say.* Pl. VII, fig. 9—Black, hind angles of thorax more distinct. Length, .40–.52 in. = 10–13 mm. A common species in the Atlantic and Middle States.

Habitat: Atlantic region generally and west to Nevada.

P. pennsylvanicus *Lec.*—Commences a series of four species in which the dorsal punctures of the elytra are very large, foveate. The species are distinguished with difficulty, the chief points of difference (as developed by Dr. LeConte) being given in the table. Length, .44 in. = 11 mm.

Habitat: Northeastern America.

P. vitreus *Dej.*—Length, .46 in. = 11.5 mm.

Habitat: New Hampshire, California and Alaska.

P. luczotii *Dej.*—Length, .40–.50 in. = 10–12.5 mm.

Habitat: Northern portion of North America from Massachusetts and New York to British Columbia.

P. orinomum *Kirby.* Pl. VII, fig. 10.—Very close to the preceding. Length, .45 in. = 11 mm.

Habitat: Nova Scotia, Canada, Lake Superior, Oregon, British Columbia.

P. erythropus *Dej.* Pl. VII, fig. 11.—A small black shining species, with reddish legs, thorax subquadrate, angles much rounded. Posterior tarsi with four joints grooved externally. Length, .33–.34 in. = 8–8.5 mm.

Habitat: Northeastern America, west to Colorado.

P. patruelis *Dej.*—With *femoralis* and *corrusculus* forms a small group in which the scutellar stria is long, the prothorax feebly narrowed behind and the basal impressions single. The hind tarsi have three joints grooved on the outside. Length, .30 in. = 7.5 mm.

Habitat: Northeastern America, west to Wisconsin and Iowa, north to Alaska.

three or four. First antennal joint rufous at base. Legs blackish-piceous, trochanters and base of femora rufescent. Length, .36–.40 in. = 9–10 mm.

Habitat: New Hampshire, Alaska (Island of Kadjak).

P. hudsonicus *Lec.*—Elongate, black, highly polished, thorax subcordate, not wider than long, hind angles rectangular. Legs obscurely ferruginous. Length, .28–.38 in. = 7–9.5 mm.

Habitat: New Hampshire, Labrador, British Columbia, Alaska, Lake Superior Region, Colorado (Red Cliff).

P. empetricola *Dej.*—Black, slightly bronzed or brownish above, thorax cordate; elytra oblong-ovate, finely striato-punctate, dorsal punctures four. Base of antennæ and legs rufous. Length, .28 in. = 7 mm.

Habitat: New Hampshire, Hudson's Bay Territory, Alaska.

P. mandibularis *Kirby.*—Black, above somewhat bronzed. Legs and base of antennæ reddish or brownish. Thorax cordate, hind angles punctured. Elytral striæ punctulate. Length, .25–.28 in. = 6–7 mm.

Habitat: New Hampshire, Massachusetts, Canada, Wisconsin, Hudson's Bay, Alaska.

Evarthrus *Lec.*

Resembling *P.erostichus*, especially that group in which there is a single dorsal puncture. Prosternum margined behind, elytra with one dorsal puncture. Posterior tarsi not grooved externally; labial palpi with the last joint shorter than the penultimate which bears several long setæ in front. This last character separates it most readily from *Pterostichus* in which there are but two of these setæ.

Synopsis of Species.

Prothorax subquadrate, not constricted at base, prosternum deeply sulcate.
  Elytral striæ strongly punctured.
    Margin of prothorax narrow, nearly uniform.................... **sigillatus.**
    Margin of prothorax wide, especially at base .... **seximpressus.**
  Elytral striæ finely purrnctured.
      Prothorax wider than long, no true scutellar stria........... **americanus.**
      Prothorax as long as wide, scutellar stria rather long............ **orbatus.**
Prothorax strongly constricted behind, posterior angles rectangular.
    Hind angles of prothorax very prominent........................... **colossus.**
    Hind angles less prominent, shorter.
      Sides of prothorax much rounded................................ **sodalis.**
      Sides of prothorax less rounded, more oblique..................... **furtivus.**

E. sigillatus *Say.*—Black, ♀ dull opaque, ♂ sometimes less so. Thorax subquadrate, sides rounded, hind angles obtuse, margin fine, reflexed. Elytral striæ deep. Length, .60–.68 in. = 15–17 mm.

Habitat: New Jersey, south and west, to Maryland, Missouri, Kansas and Texas.

E. seximpressus *Lec.*—Close to the preceding, differing in the characteristics given in the table. Length, .58–.62 in. = 14.5–15.5 mm.

Habitat: Illinois, Missouri, Louisiana, Iowa, Kansas, Texas.

E. americanus *Dej.*—Thorax slightly narrowed anteriorly, margin fine, not reflexed. Length, .60–.80 in. = 15–20 mm.

Habitat: Texas, Florida, Louisiana, Ohio, Pennsylvania, Wisconsin.

E. orbatus *Newm.*—Thorax not broader than long, and little narrowed behind, margin narrow and scarcely reflexed. Length, .65–.68 = in. 16–17 mm.

Habitat: Illinois, Kentucky, Georgia, Alabama, Missouri, Wisconsin, Iowa, Nebraska, Texas.

E. colossus *Lec.*—Black, thorax transverse, sides much rounded and sinuate posteriorly, hind angles prominent. Length, .64–.88 in. = 16–22 mm.

Habitat: Illinois, Missouri, Nebraska, Louisiana.

E. sodalis *Lec.*—Separable by the less prominent hind angles of the prothorax from *colossus*. It is also smaller. There is a good deal of variation in the development of the posterior thoracic angles. Length, .60–.68 in. = 15–17 mm.

Habitat: Pennsylvania, Ohio, Illinois, Iowa, Wisconsin, Missouri, Kansas, Texas, Tennessee.

E. furtivus *Lec.*—The thorax is different from the preceding spe-

CORRECTION OF A MISIDENTIFICATION—ATTACUS SPLENDIDUS.

By HARRISON G. DYAR.

In the revision of the genus *Attacus* by Mr. Neumoegen and myself (Journ. N. Y. Ent. Soc. II, 122), we recognized two species as possibly occurring in the United States, *erycina* (*splendidus*) and *jorulla*. Recently in comparing Cramer's plate 68 A with Maassen and Weymer's figs. 32 and 34, both of which are given by Kirby under the references for *erycina*, I find that the species is an entirely different one from that which we had before us and described under that name. The misidentification is an old one. In the first volume of Entomologica Americana is a comparison of the two species in question, from which it is obvious that the "*splendidus*" there referred to is the same as the one in the Neumoegen collection, namely *orizaba* Westwood. Later in the same journal, Mr. Neumoegen is quoted as stating that *splendidus* and *orizaba* were identical; but Mr. Neumoegen had never seen the figures of *splendidus*, and depended upon his collection. Probably the inclusion of *splendidus* in Mr. Grote's list of 1882 is based on the same misidentification, and it may even prove traceable back to Clemens in 1860. Our species should stand:—

Attacus orizaba *Westwood.*

1853—Westwood, Proc. Zoöl. Soc. Lond. p. 158, pl. 32, fig. 2.
1860—? Clemens, Proc. Acad. Nat. Sci. Phil. 160 (as *splendidus.*)
1882—Grote, Check List, p. 20 (as *splendidus.*)
1884—Murtfeldt, Can. Ent. XVI, 131 (as *cinctus*).
1885—Hulst, Ent. Amer. I, 78 (as *splendidus*).
1885—Neumoegen, Ent. Amer. I, 160 (as *splendidus*).
1891—Smith, List Lep. p. 31 (as *splendidus*).
1894—Neumoegen and Dyar, Journ. N. Y. Ent. Soc. II, 122 (as *erycina*).

As to our other *Attacus*, recorded from Arizona, *A. jorulla* Westw., I believe that it has a much more extended synonymy than that given by us. *A. betis* Walk., *A. arethusa* Walk., *A. bolivar* Maass. & Weym., *A. maurus* Burm., *A. cinctus* Tepp., and *A. speculum* Maass. & Weym., are among the forms which seem to be synonyms or local forms of *jorulla*. This matter will, however, find a more suitable place of treatment when the whole genus is monographed.

LOCAL ENTOMOLOGICAL NOTES.

Members of the New York Entomological Society and all others are solicited to contribute to this column their rare captures, local lists and other items of interest relating to the insect fauna of New York City and vicinity.

EGG-CAPSULES OF CHRYSOCHUS AURATUS (*FAB.*).

By J. L. ZABRISKIE.

On July 2, 1895, a few imagos of *Chrysochus auratus* were taken on a small patch of the Spreading Dogbane, *Apocynum androsæmifolium*, growing beside a certain street in Flatbush, L. I. On the 9th of the same month, while examining the same plants, a specimen of *Chrysochus* was discovered ovipositing in the opening at the summit of a little black cone, on a fence post close by the plants. In the open crater of the little cone was an egg, evidently just deposited, and close by the first cone was situated a similar little black cone entirely closed. Similar little black masses were found on the stems and especially on the under surface of the leaves of the plants near at hand.

These black masses are evidently the egg-capsules of *Chrysochus*. On the 20th of the same month two of these collected capsules were opened, one of which contained what appeared to be four empty egg shells, and the other contained two plump apparently living eggs. None of these, however, hatched in captivity.* The capsules measure about 3 mm. in length by 2 mm. in height, although frequently two capsules are joined and partly overlap each other. Their substance is

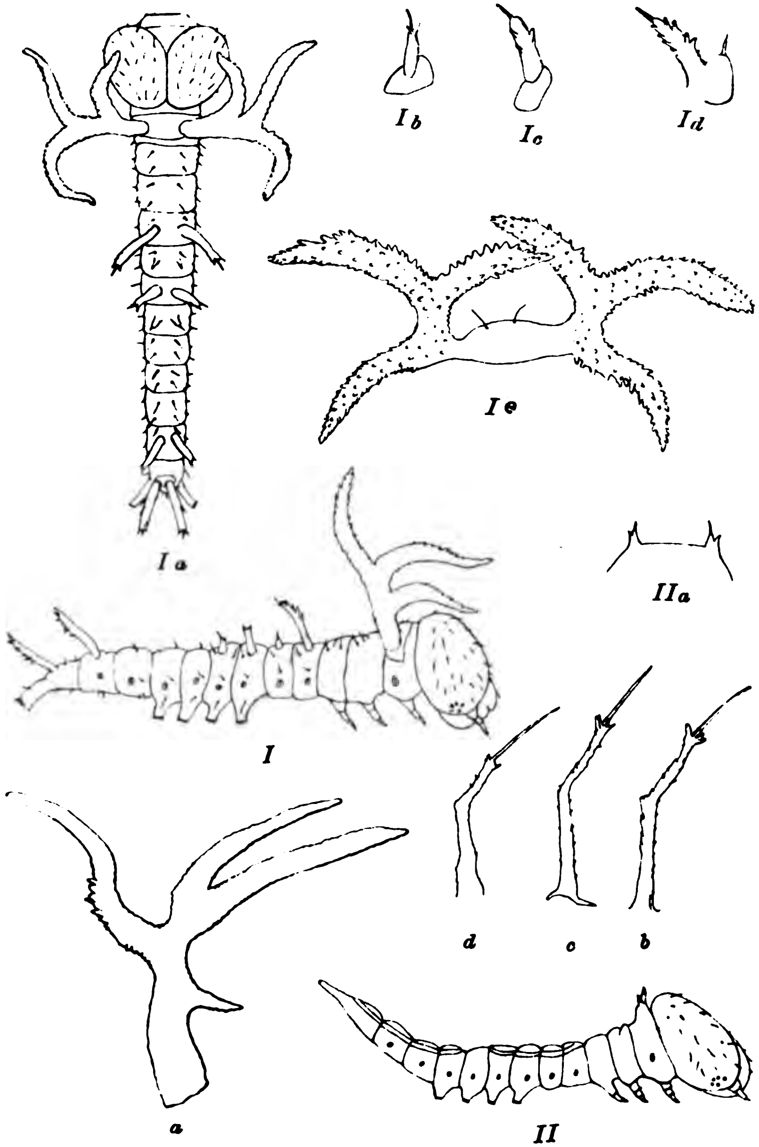
INDEX TO VOLUME III.

Acrolepia assectella, 19
Acrosoma, species of, 88
Adela viridella, larva of, 18
Admestina wheeleri, 92
Admontia pergandei sp. nov. 54
  nasoni, sp. nov., 55
Adoneta spinuloides, larva of, 146
Æschna clepsydra, 46
  constricta, 46
  verticalis, 45
Agalena nævia, 82
Agrœca minuta, sp. nov., 80
  ornata, 80
  pratensis, 80
Agrotera, 173
Amaurobius bennetti, 82
  ferox, 83
Amobia californica, sp. n., 100
Amphiagrion saucium, 43
Anax junius, 46
Ancylorrhanis hirsuta, 85
Anomalagrion hastatum, 44
Anyphæna gracilis, 80
Apoda biguttata, 146
  y-inversa, life history of, 146, 151
Asagena americana, 84
Astia vittata, 92
Araba tergata, sp. nov., 103
Arctia anna, larval stages of, 178
  phyllira, life history of, 178
Argia bipunctulata, 43
  putrida, 43
  violacea, 43
Argiope riparia, 89
  transversa, 89
Argyrodes cancellatus, 83
  trigonum, 83
Argyroepeira hortorum, 89
Argyrophylax rostrata, sp. nov. 106
Ariadne bicolor, 77
Atemnus elongatus, sp. nov., 10
Atlanticus pachymerus, 142
Attacus orizaba, 191
  splendidus, 191
Attus sylvestris, 92
Aulonia aurantica, 91
Aulonia funerea, 91
Ballus youngi, 92
Banks, N. articles by, 1, 66, 76, 128
Basiæschna janata, 45
Bathpyhantes, species of, 87
Beutenmüller, W. articles by, 59, 137, 138, 143
Bombycine larvæ, 175
Bombyx, 171
Brephidæ, larvæ of, 21
Brephos infans, 140
Calasymbolus, list of, 133
Callilepis imbecilla, 78
Callimorpha, notes on, 59
  lecontei, larval stages, 176
Calopteryx, list of, 41, 42
Carabodes granulatus, sp. nov., 129
Calvert, P. P. article by, 39
Catocala, 173
  coccinata, note on, 143
Celithemis elisa, 48
  eponina, 48
Ceratinella, list of, 85
Cesonia bilineata, 79
Chætophleps, gen. nov., 51
  setosa, sp. nov., 51
Chætoplagia atripennis, gen. nov. et sp., 98
Chelanops, synopsis of and notes on, 4
  dentatus, sp. nov., 6
  dorsalis, sp. nov., 8
  latimanus, sp. nov., 6
  morosus, sp. nov., 7
  tristis, 7
  tumidus, sp. nov., 7
  validus, sp. nov., 7
  virginica, sp. nov., 6
Chelifer, synopsis of, 2
  biseriatum, sp. nov., 3
  cancroides, 3
  floridanus, 3
  mirabilis, sp. nov., 4
  muricatus, 3
  scabrisculus, 4
Chironomidæ, habits of, 134
Chrysochus auratus, ovaposition of, 191
Chthonius, synopsis of species, and notes on, 13
Cicada septendecim, 33, 142
Cicindela generosa, 141
  hirticollis, 141
  modesta, 141
  repanda, 141
  vulgaris, 141
Cicurina arcuata, 82
  creber, 82
Clark, C. U., article by, 61
Clausicella antennalis, sp. nov., 56
  tarsalis, sp. nov., 56
Clemensia albata, young larva of, 176
Clisiocampa fragilis, larva of, 23
  neustria, larva of, 24
Cubiona, list of species of, 79
  littoralis, sp. nov., 79
Clytiomyia atrata, sp. nov., 53
  exile, sp. nov., 53
  punctata, sp. nov., 52
Cnethocampa, larvæ of, 22, 23
Cœlotes medicinalis, 82
  nigriceps, sp. nov., 82
Coleophora ochripennella, larva of, 20
Coleoptera, N. E. Am., 73, 180
Conocephalus dissimilis, 142
  ensiger, 142
  exiliscanorus, 142
  robustus, 142
Copismerinthus, list of, 132
Coquillett, D. W., articles by, 49, 97
Coriarachne versicolor, 90
Cordulegaster diastatops, 45
Cornicularia, species of, 86
Cressonia juglandis, 133
Culicidæ, habits of, 134
Cucullia, 171
Cyclosa conica, 89
Cyrtophleba horrida, sp. nov., 101
Datana chiriquensis, sp. nov., 167
Davis, W. T., article by, 140
Degeeria washingtonæ, sp. nov., 104
Demas propinquilinea, larva of, 130

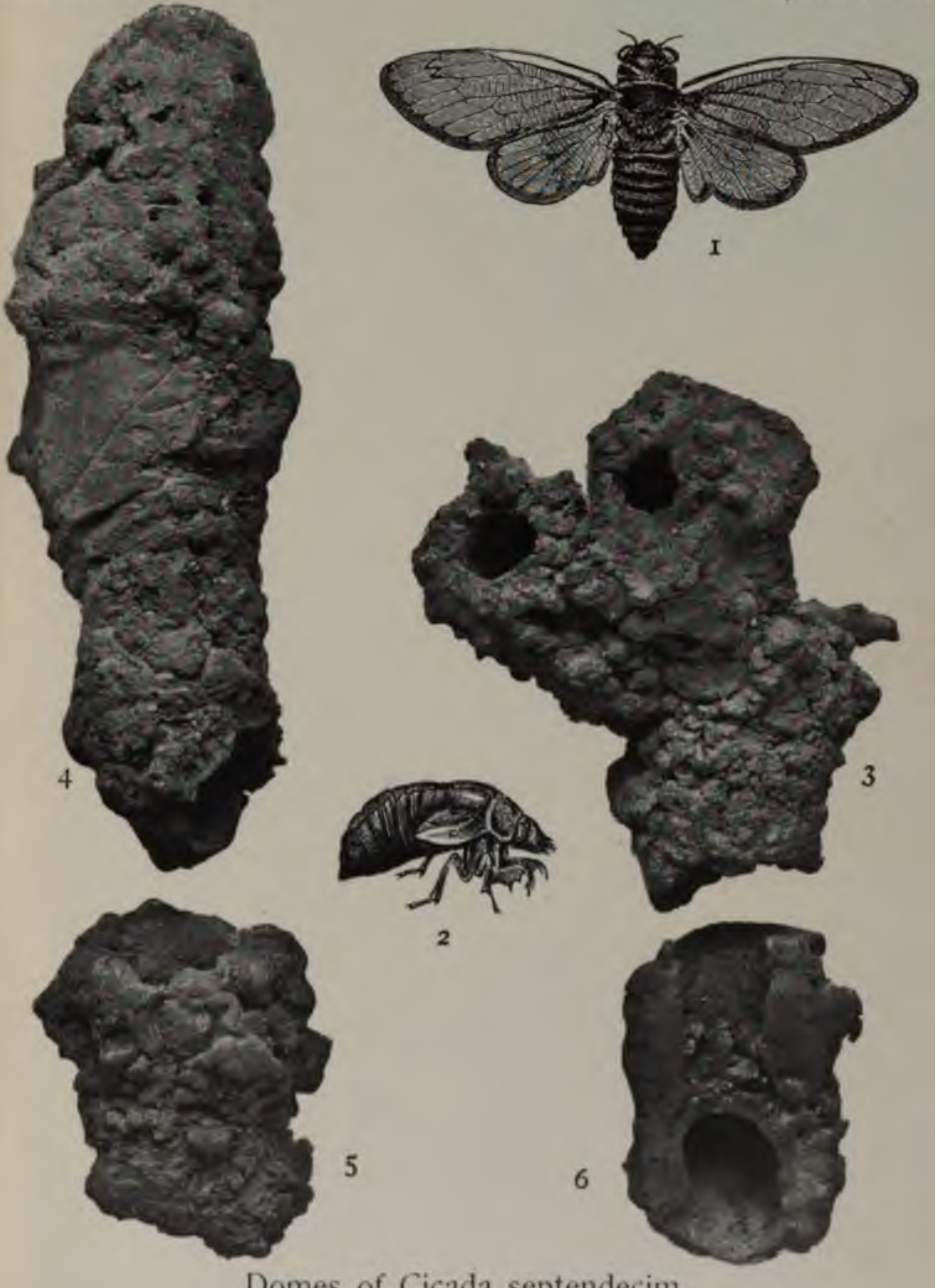
Dendryphantes, list of L. I., 92
Diabrotica, origin of, 158
Dictyna, list of L. I., 83
Didymops transversa, 46
Dichelonycha fuscula, 143
Diplax, list of N. Y., 48
Diplostyla concolor, 87
  nigrina, 87
Dipœna nigra, 84
Diptera, habits of, 134
Ditmars, R. L., article by, 62
Dolomedes tenebrosus, 91
  urinator, 91
Drepana, notes on, 166
Drepanid larvæ, 66
Drapetisca socialis, 87
Drassus robustus, 77
Dromogomphus spinosus, 45
Dyar, H. G., articles by, 17, 59, 66, 130, 145, 167, 191
Ebo latithorax, 91
Elaphrus ruscarius, 141
Emphanopteryx theutis, 56
Enallagma, list of N. Y.. 43, 44
Endrosis lacteella, larva, 19
Ennomos alniaria, larval stages of, 137
Enoplognatha marmorata, 84
Epiæschna heros, 45
Epiblemum scenicum, 92
Epicordulia princeps, 46
Epeira, list of L. I., 88, 89
Ergane borealis, 92
Erigone, list of L. I., 87
Ero thoracia, 83
Erpyzon, 174
Erythromma conditum, 43
Euclea delphinii, larva, 146
  indetermina, larva, 146
  pænulata, larva, 146
Gastropacha quercifolia, larva of, 24
Gayenna, list of, L. I., 80
Gelechia rhombella, larva of, 19
Geometrid moths, origin of, 30
Gnaphosa sericata, 78
Gomphus, list of N. Y., 44, 45
Grammonota inornata, 86
  ornata, 86
  pallipes, sp. nov., 86
  trivittata, sp. nov., 86
Grote, A. R., articles by, 132, 166, 168
Gymnopareia, 50
Gymnoprosopa fulvicornis, sp. nov., 106
Habrocestum coecatum, 92
  peregrinum, 92
Hadena, 172
Hagenius brevistylus, 44
Hahnia agilis, 82
Hemileucidæ, scent organs of, 124
Haploa confusa, larval stages, 59
  lecontei, egg of, 59
Harrisina coracina, note on larva of, 150
Hepialidæ, larvæ of, 69
Hepialus argenteomaculatus, note on, 69
  hectus, larva of, 71
  humuli, " " 71
  mustelinus, larva of, 70
  thule, egg of, 69
Hetærina americana, 42
Heterocampa obliqua,
Ichnura ramburii, 44
  verticalis, 44
Icius, list of L. I., 92
Ideobisium, notes on species of, 10, 11
Idionella formosa, 85
Insects of Staten Island, 140
Lælaps placidus, sp. nov., 128
Lagoidæ, scent organs of, 124
Lander B., article by, 33
Lasioneura, gen. nov., 50
  johnsoni, sp. nov., 50
  palloris, sp. nov., 50
Lasiocampidæ, larvæ of, 23
Lasiocampa quercus, larva of, 24
Lathrodectes mactans, 84
Laverna phragmitella, larva of, 19
Leptidæ, habits of, 134
Lepidoptera, classification of, 17
Lepthyphantes minuta, 87
Lestes, list of N. Y., 43
Libellula, list of N. Y., 47
Linyphia, list of L. I., 87
Lioptilus scaradactylus, larva of, 20
Lioptilus microdactylus, larva of, 20
Liparidæ, scent organs of, 124
Lispidea, gen. nov., 51
  palpigera, sp. nov., 52
Lithyphantes corollatus, 84
Local Ent. Notes, 39, 76, 144, 172
Lophocarenum, list of L. I., 87
Lycænidæ, scent organs

Misumena, list of L. I., 90
Mitopus californicus, sp. n., 66
Morse, A, P., articles by, 14, 107
Morton, E. L., article by, 145
Myas, synopsis of species, 180
Myiobia thecata, sp. n., 105
Muscidæ, habits of, 134
Nannothemus bella, 48
Nehalennia irena, 43
Nemoræa labis, sp. nov., 104
Neon nelli, 92
Neophanes pallidus, 83
Neumoegen, B., obituary of, 95
Neurocordulia uhleri, 46
Nisoniades brizo, 141
Noctuidæ, scent organs of, 123
Nolidæ, note on larvæ of, 22
  scent organs of, 124
Nomius pygmæus, 74
Nomotettix compressus, sp. nov., 15
  parvus, sp. nov., 14
  simplex, sp. nov., 130
Notodontidæ, scent organs of, 123
Nymphalidæ, scent organs of, 123
Nymphula, 174
Obisium carolinensis, sp. nov., 12
  parvulum, sp. nov., 12
  synopsis of species, 11
Odontata, list of N. Y., 39
Œcanthus angustipennis, 142
  latipennis, 142
  nigricornis, 142
  niveus, 142
Œdematophorus lithodactylus, larva of, 21
Œnetus virescens, pupa of, 72
Olpium obscurum, 10
Omophron americanum, 141
Ophiogomphus rupinsulensis, 44
Opsidia gonoides, gen. nov. et sp., 102
Ordgarius bisaccatus, 88
Orchestina saltitans, 77
Orthoptera, scent organs of, 125
Oribata emarginata, 129
  palustris, sp. nov., 128
Oribatella setosa, sp. n., 129
Orneodes hexadactyla, larva of, 20
Oreta rosea, larva of, 67
Oxyptila conspurcata, 90
  monroensis, 90
Oxyptilus persicelidactylus, larva of, 21
Oxyopes scalaris, 91
Packard, A. S., articles by, 27, 30, 69, 110, 175
Packardia elegans, larva of, 146
  geminata, larva of, 146
Pachygnatha, list of L. I., 89
Pachydiplax longipennis, 48
Panagæus, synopsis of, 73
Paonias excæcatus, 133
Papilio ajax, 141
Papilionidæ, scent organs of, 123
Parasa chloris, larva of, 146
Paraplagia cinera, sp. nov., 101
Paraphyto chittendeni, gen. nov. et sp., 105
Pardosa, list of L. I., 91
Patrobus, synopsis of species, 74
Perithemis domitia, 48
Perophora melsheimerii, young larva of, 175
Perophoridæ, scent organs of, 123
Pholcus phalangoides, 77
Phidippus audax, 92
  rufus, 92
Philodromus, list of L. I., 90, 91
Phalangids, two Californian species of, 66
Phryganidia californica, larva of, 21
Phyciodes nycteis, 143
Phylloscirtus pulchellus, 142
Phyto setosa, sp. nov., 99
Phrurolithus formica, sp. nov., 81
  similis, sp. nov., 81
Plathemis trimaculata, 47
Pirata, list of L. I., 91
Pisaura undata, 91
Platypteryx arcuata, larva of, 67
Platypterygidæ notes on, 166
Platyptilus rhododactylus larva of, 21
Plectana stellata, 88
Plutella porrectella, larva of, 19
Pœcilia, 171
Pœcilochroa variegata, 78
Pogonus texanus, 75
Polypogon, 174
Polyptychus quercus, 133
Prosthesima, list of L. I., 77
  insularis, sp. nov., 78
  nova, sp. nov., 78
Proceedings N. Y. Ent. Soc, 93, 144
Pseudomyothyra tortricis, sp. nov., 55
Pseudoscorpionida, notes on the, 1
  synopsis of, 2
Psychodidæ, habits of, 134
Pterostichus, synopsis of, 181
Pyrausta, 173
Pyralis, 173
Romphæa fictilum, 83
Runcinia aleatoria, 90
Saitis pulex, 92
Salticus albocinctus, 93
Saturnia, 171
Scopula, 174
Scent glands of insects, 110
Schrank's genera, 168
Scytodes thoracica, 77
Sibine stimulea, larva of, 146
Simæthis pariana, larva of, 18
Simulidæ, habits of, 134
Singa maculata, 89
  variabilis, 89
Sisyrosea inornata, larva of, 146
Slug Caterpillars, histories of, 145
Smerinthus populi, 133
Smerinthinæ, notes on, 132
Somatochlora, list of N Y., 46
Spermophora meridionalis, 77
Sphinx plebeius, larva of, 58
Spiders, list of Long Island, 76
Spilosoma congrua, young larva of, 177
Spiropalpus spiralis, 86
Steatoda borealis, 84
Stemonyphantes bucculentus. 87
Synageles picata, 93
  scorpiona, 93
Synemosyna formica, 93
Tabanidæ, habits of, 134
Tapinopa bilineata, 87
Tachopteryx thoreyi, 44
Tachinidæ, synopsis of genera of, 49
Tegenaria derhami, 82
Tenthredinidæ, scent organs of, 124
Tetragoneuria cynosura, 46
  semiaquea, 46

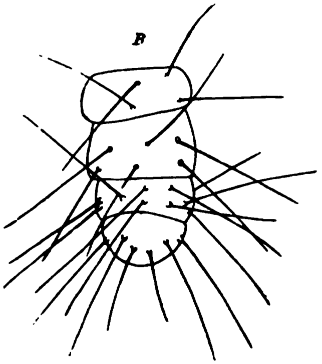
Tetragnatha grallator, 89
  laboriosa, 89
Tineina, scent organs of, 122
Tettigidea acuta, sp. n., 15
  armata sp. nov., 107
  depressa, v. nov., 107
  apiculata, sp. nov., 16
  prorsa var. elongata, var. nov., 16
  spicata, sp. nov., 108
Tettiginæ, N. Am., 14, 107
Thanatus rubicundus, 90
Thargalia, list of L. I., 80
Thecla acadica, 143
  augusta, 141
  damon, 141
  niphon, 141
Theridiosoma gemmosa, 89
Theridula sphærula, 84
Theridium, list of L. I., 83
  albidum, sp. nov., 84
Thryptocera dunningii, sp. nov., 54
Tipellus duttoni, 90
Tinea pellionella, larva of, 19
Tischeria complanella, larva of, 20
Titanœca americanus, 83
Tmarsus caudatus, 90
Tmeticus, list of L. I., 87
Tortricidia flavula, larva of, 146
  fasciola, larva of, 146
  testacea, larva of, 146
Townsend, C. T. H., article by, 134
Trachelas tranquilla, 81
Tramea carolina, 47
  lacerata, 47
Trechus, synopsis of, 76
Tridactylus terminalis, 142
Triptogon modesta, 133
  var. occidentalis, 133
Trochosa cinerea, 91
  rubicunda, 91
Ulesanis americana, 85
Uloborus plumipes, 83
Vixia infumata, 89
Webster, F. M., articles by, 139, 158
Wickham, H. T., article by, 180
Xysticus, list of L. I., 89, 90
  fraternus, sp. nov, 90
Zabriskie, J. L., article by, 192
Zygoballus, list of L. I., 92

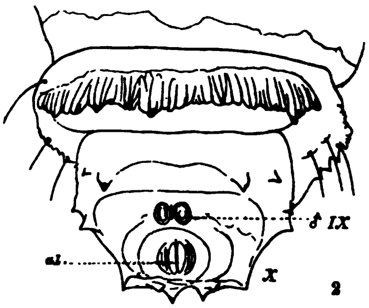


Early stages of Heterocampa obliqua
and H. guttivitta.

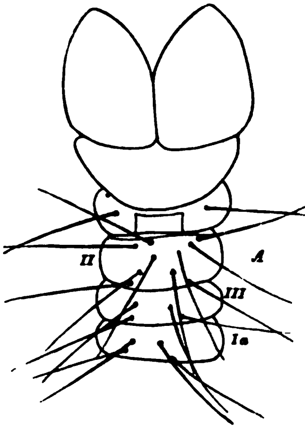


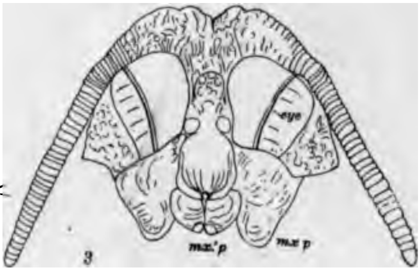
Domes of Cicada septendecim.



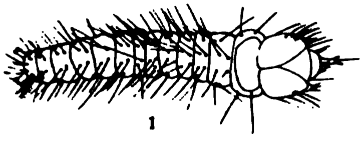


2

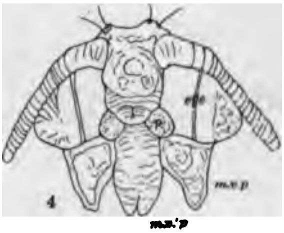




3

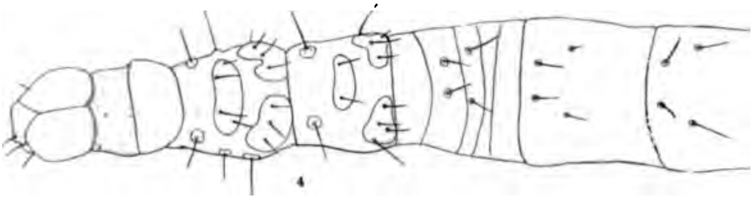


1

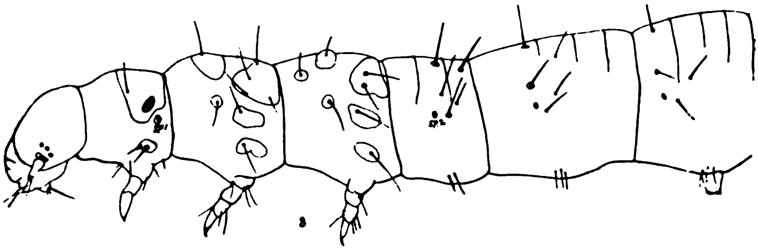


4

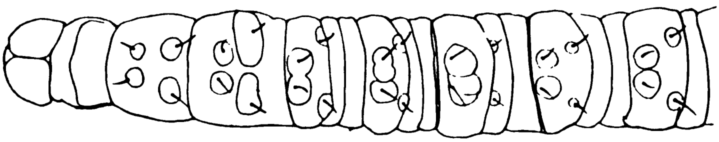
Larva and Pupa of Hepialidæ.



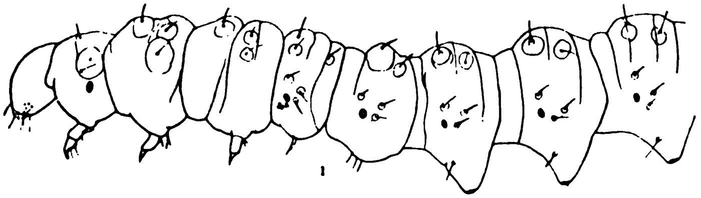
4



3



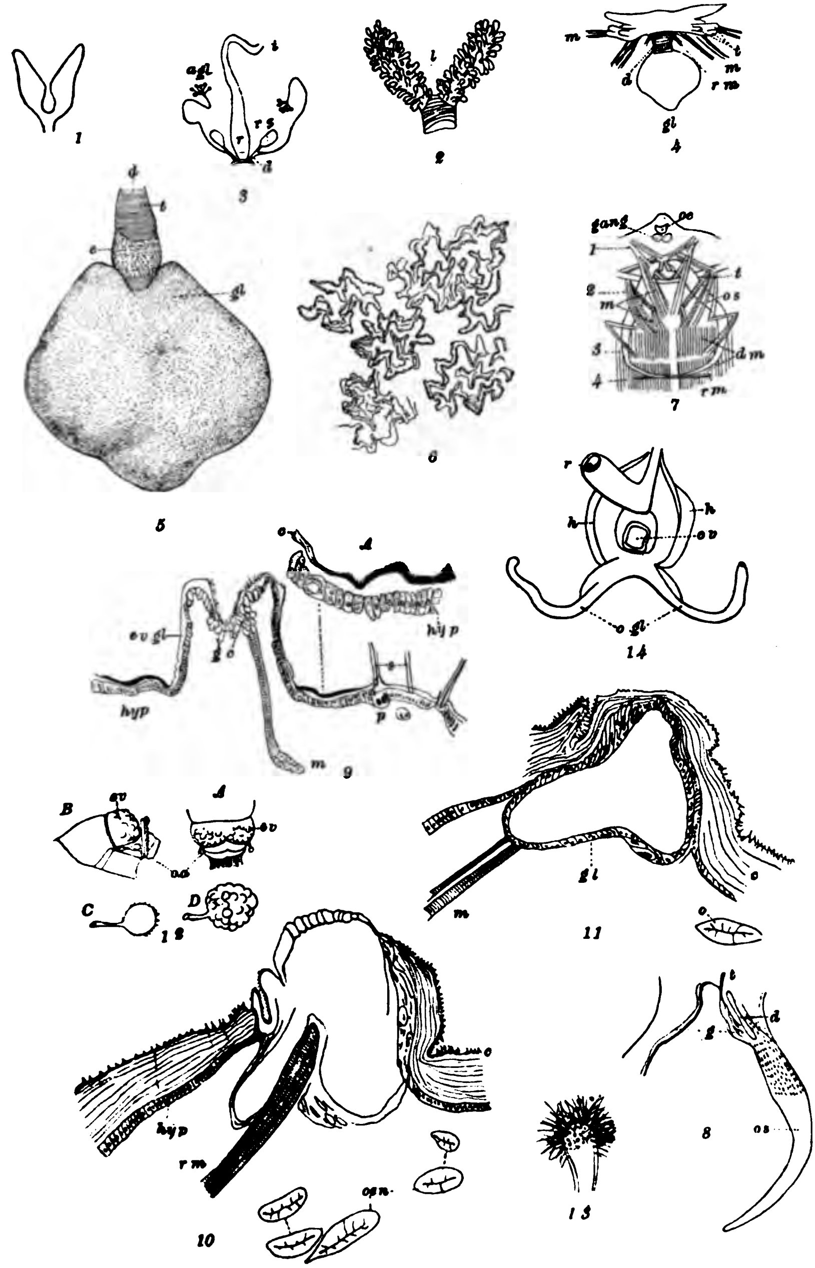
2



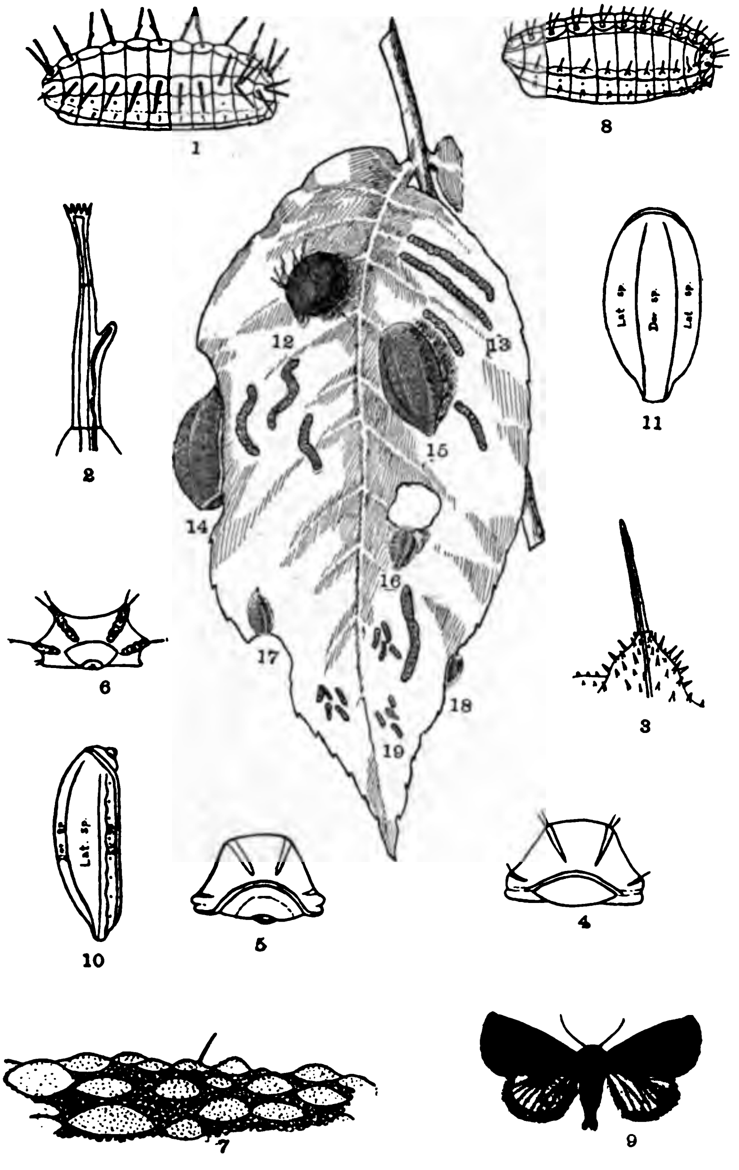
1

Larva of Hepialus humuli and hectus.

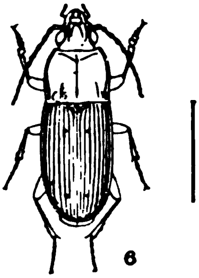
Journ. N. Y. Ent. Soc. *Vol. III. Pl. V.*



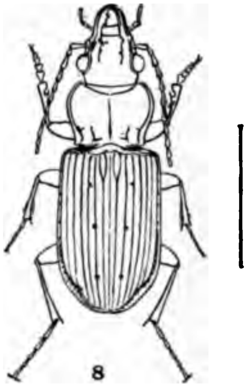
Scent Glands of Insects.



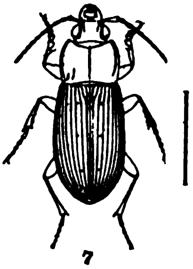
Life-History of Apoda Y-inversa.



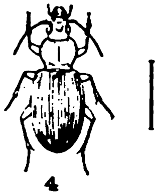
6



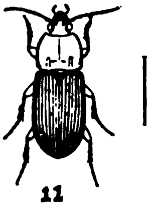
8



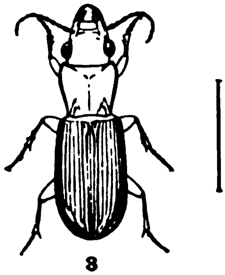
7



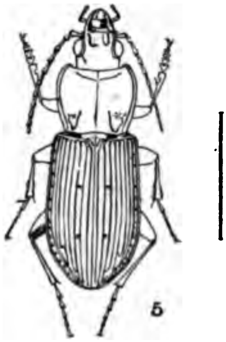
4



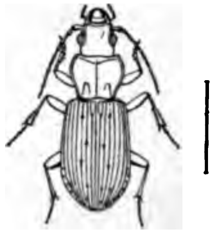
11



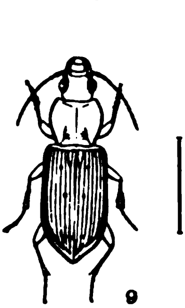
3



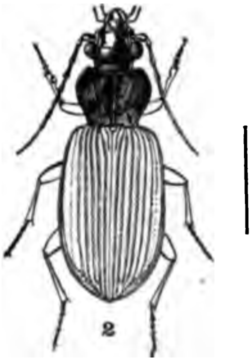
5



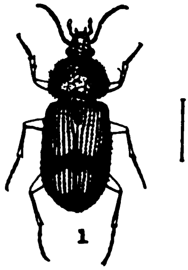
10



9



2



1

Carabidæ N. E. America.

Announcement.

AUCTION SALE OF INSECTS.

The New York Entomological Society for the past few years has held regular auction sales of insects for the benefit of the Journal. These sales have proven not only of value to the members of the Society, but also of great assistance towards defraying the cost of publishing the Journal. In order to give all parties not residing in New York, or those who cannot attend the sales, a chance to purchase, it has been decided to publish from time to time a list of the rarer species on hand, so as to enable interested parties to send in their bids. The following is a list of the species now on hand.

THE PUBLICATION COMMITTEE.

Lepidoptera.

Papilio eurymedon.
Argynnis montinus.
Colias var. ariadne.
Chionobas semidea.
Pieris oleracea.
Seirarctia echo.
Arctia virgo.
Euprepia americana.
Spilosoma prima.
Spilosoma antigone.
Cerura borealis.
Cerura occidentalis.
Hyproprepia fucosa.
Schizura apicalis.
Ichthyura brucei (or vau.).
Parorgyia parallela ♂.
Platoeceticus gloveri.
Oiketicus abbotii.
Lophopteryx elegans.
Notodonta stragula.
Oedemasia badia.
Alypia langtonii.
Nerice bidentata.
Pheosia rimosa.
Hepialus 4-maculatus.
Euchætes oregonensis.
Euchætes englenensis.
Hepialus gracilis.
Composia fidelissima.
Burtia belæ.
Hyparpax auristriata.
Hyparpax auristriata var. tyria.
Gortyna purpurissata.
Anarta schonherri.
Plusia epigea.
Plusia viridisignata.
Smerinthus cerisyii.
Triptogon modesta.

Coleoptera.

Cicindela longilabris.
Cicindela tortuosa.
Cychrus lecontei.
“ viduus.
Carabus chamissonis.
Pasimachus subsulcatus.
Nebria sahlbergi.
Pterostichus hudsonius.
Pterostichus sculptus.
Amara hypeborea.
Lebia furcata.
Batrisus globosus.
Staphylinus tomentosus.
Languria marginipennis.
Brachyacantha 10-pustulata.
Saprinus ferrugineus.
Hyperaspis lugubris.
Hyperaspis bigeminata.
Pytho americana.
Byrrhus geminatus.
Anthicus scabriceps.
Georyssus pusillus.
Ditoma 4-guttata.
Lemophlacus modestus.
Corymbites virens.
“ nudianus.
“ cruciatus.
“ resplendens.
Elater apicatus.
Elater rubricus.
Cryptohypnus abbreviatus.
“ sanborni.
“ restrictus.
“ exiguus.
Anthophilax attenuatus (rare).
Elaphidion truncatum ?
Bellamira scalaris.
Leptura 6-maculata.
Leptura chrysocoma.
Rhopalopus sanquinicollis.
Acmæops pratensis.
Euryptera lateralis.
Neoclytus muricatulus.
Pogonocherus penicellatus.
Cryptocephalus bivius.
Cryptocephalus obsoletus.
Bassareus croceipennis.
Colaspis costipennis.
Prasocuris varipes.
Monoxia consputa.
Amphicoma vulpina.
Polypleurus nitidus.
Phlœodes diabolicus.
Epitragus tomentosus.
Cteniopus murrayi.
Thanasimus undulatus.
Eugnamptus striatus.
Balaninus uniformis.
Anchonus floridanus.
Dryocœtes autographus.

JOURNAL

OF THE

NEW YORK

ENTOMOLOGICAL SOCIETY.

Devoted to Entomology in General.

Volume IV, 1896

EDITED BY WM. BEUTENMÜLLER.

NEW YORK.
PUBLISHED FOR THE SOCIETY
QUARTERLY.
1896.

CONTENTS OF VOLUME IV.

Banks, Nathan,

New California Spiders, 88
Additions to the List of Long Island Spiders, 190
A New Species of Gomphus, 193

Beutenmuller, William,

Food-Habits of North American Cerambycidæ, 73
Description of a New Moth, 149

Cockerell, T. D. A.,

Diabrotica in New Mexico, 200
New Species of Insects taken on a trip from Mesilla Valley to the Sacramento Mountains, New Mexico, 201

Davis, William T.,

The Dog's Head Butterfly on Staten Island, 200

Dyar, Harrison G., and Miss Emily Morton,

The Life-Histories of the New York Slug Caterpillars.—II, 1

Dyar, Harrison G.,

A New Gloveria, 22
On the Probable Origin of the Pericopidæ: Composia fidelissima, 68
The Larva of Syntomeida epilais, 72
Note on the Head Setæ of Lepidopterous Larvæ, with special reference to the appendages of Perophora melsheimeri, 92
The Life-History of the Florida form of Euclea delphinii, 125
Description of two Noctuid Larvæ, 145
Life-Histories of the New York Slug Caterpillars.—III-VI, 167
A New Anisota, 166

Fox, William J.,

Synopsis of the Species of the Nysson, inhabiting America, North of Mexico, 10

GROTE, A. RADCLIFFE,
Note on the Geographical Distribution and Mimicry of Apatela, ... 81
Correction of the Type of Agronoma and Note on Laspeyria, 85
Note on Samia californica, ... 201

✓ LINELL, MARTIN L.,
A Short Review of the Chrysomelas of North America . 195

MORSE, ALBERT P.,
Some Notes on Locust Stridulation, ... 16
Both Sides of Butterflies, ... 20
Illustrations of North American Tettiginæ, . . . 49

PACKARD, A. S.,
Literature on Defensive or Repugnatorial Glands of Insects, 26
The Phosphorescent Organs of Insects, ... 61
Desiderata of North American Notodontidæ, . . . 94
Notes on the Transformations of Higher Hymenoptera.—I, 155

SCHAUS, WILLIAM,
New Species of Heterocera 51, 130
New Species of Heterocera from Tropical America, . 147

SCUDDER, SAMUEL H.,
The North American Species of Nemobius, . . . 99

SKINNER, HENRY,
Impressions received from a study of our North American Rhopalocera, ... 107

SLOSSON, MRS. ANNIE TRUMBULL,
Note on Enæmia crassinervella (Mieza igninix), . . 86

WEBSTER, F. M.,
The Probable Origin and Diffusion of North American Species of the Genus Diabrotica.—II, ... 67

WICKHAM, H. F.,
Preliminary Hand-Book of the Coleoptera of Northeastern America (continued from Vol. III, p. 180), . . . 33
Description of the Larvæ of some Heteromerous and Rhynchophorus Beetles, ... 118

Proceedings of the New York Entomological Society, . 50, 95, 207

JOURNAL

OF THE

New York Entomological Society.

Vol. IV. MARCH, 1896. No. 1.

THE LIFE-HISTORIES OF THE NEW YORK SLUG CATERPILLARS.—II.

PLATE I, FIGS. 1–24.

By Harrison G. Dyar, A. M., Ph. D. and Miss Emily L. Morton.

Sibine stimulea *Clemens.*

1860.—*Empretia stimulea* Clemens, Proc. Acad. Nat. Sci. Phila. XII, 158.
1862.—*Empretia stimulea* Morris, Synop. Lep. 130.
1864.—*Empretia stimulea* Packard, Proc. Ent. Soc. Phila. III, 340.
1869.—*Limacodes ephippiatus* Harris, Corresp. p. 361, pl. 1, fig. 7.
1890.—*Empretia stimulea* Packard, 5th Rept. U. S. Ent. Com. 147.
1892.—*Empretia stimulea* Kirby, Syn. Cat. Lep. Het. I, 539.
1892.—*Sibine ephippiatus* Kirby, Syn. Cat. Lep. Het. I, 540.
1894.—*Sibine stimulea* Neumoegen and Dyar, Journ. N. Y. Ent. Soc. II, 72.

Larva.

1860.—Clemens, Proc. Acad. Nat. Sci. Phila. 159.
1869.—Harris, Corresp. p. 175, pl. 2, figs. 10, 11.
1869.—Packard, Guide Stud. Ins. 289.
1876.—Wetherby, Cincin. Journ. Sci. II, 369.
1877.—French, Trans. Dept. Agr. Ill. XV, 187.
1883.—Saunders, Ins. Inj. Fruits, 113.
1885.—Hubbard, Ins. Aff. Orange, 142.
1888.—Beutenmüller, Ent. Amer. IV, 75 (Food Plants).
1890.—Packard, 5th Rept. U. S. Ent. Comm. p. 146, fig. 50; p. 424 (Food Plants).
1893.—Packard, Proc. Am. Phil. Soc. XXXI, 85, pl. I, figs. 1–3 (egg larval stages).
1894.—Dyar, Ann. N. Y. Acad. Sci. VIII, 216.
1895.—Comstock, Manual Stud. Ins. 225, fig. 246.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal and lateral spaces broad, subventral space narrow, contracted. Ridges very slight, the subdorsal indicated only by the change in direction in the slope of the body, lateral and subventral ridges more distinct, approximate. The ancestral warts converted into fleshy horn-like processes, unequally elongated; in stage I bearing a few slender setæ (Plate I, fig. 1); after the first molt, the subdorsal and lateral rows covered with numerous urticating spines, the subventral row rudimentary, represented by two weak setæ. Of the subdorsal row, the "horns" on joints 3 to 5 and 11 to 13 are distinct, those on joints 6 to 10 rudimentary, but a seta is present even in the last stage. Of the lateral row, the one on joint 5 is absent.

Depressed areas very feebly developed, only their glandular centers distinguishable as slight pits, partially free from skin spines; the dorsal row (1) consequently paired, the addorsal row (2) still slighter, only distinguishable on certain segments or at favorable times, such as just before a molt. Of the lateral rows, the lateral (4) and lower intersegmental lateral (6) can be made out as slight pits. No others visible. In the contracted subventral space, the two large rows (7 and 8) appear as faint glandular dots, nearly in line. Skin at first smooth, in the later stages finely spinulose.

At the last molt, besides certain changes in color, the length of the "horns" is markedly reduced and their skin-spines shortened. Certain highly modified, easily detachable skin-spines appear, the shorter ones, designated "caltropes" by Dr. Packard, occur in patches at the ends of the horns of the lateral row on joints 6 to 11; the long ones arise from four circular areas of the skin at the posterior end of conversion of the primitive setæ into urticating spines on the two upper rows of warts and in the development of certain detachable specialized skin spines in the last stage.*

AFFINITIES, HABITS, ETC.

The genus *Sibine* contains but one species in North America, north of Mexico, though represented by several in Central and South America, with most interesting larvae, to judge by Sepp's figures. Our larva is nearly allied to *Euclea*, *Adoneta* and *Parasa*, possessing in common with them most of the special structural characters described above. It is the most specialized larva of its group ("type 2"). This is one of our most common species of Eucleidæ, and has a wide range of food plants; basswood, cherry, chestnut, oak, corn leaves and *Canna indica* being a few among its many favorites. The young larvæ feed indifferently on the upper or underside of the leaf, consuming all but a thin skin, and unlike *y-inversa*, feeding around themselves, leaving irregular patches on the surface where they have fed (Plate I, fig. 21) until they reach the third stage, when the whole leaf is devoured in large holes, either on the edge or in the body of the leaf.

The species is single brooded, the moths (Plate I, fig. 15) appearing in July. The males fly, seeking their mates in the early twilight, and on favorable nights (warm and damp with a slight breeze) come in swarms to the cages, their wings fluttering and dancing rapidly over the surface of the gauze wire, where the females are confined, or darting in circles about the cages seeking an entrance. The couples remain paired usually until the same hour the next evening, though occasionally they separate earlier. The females lay their eggs during the night, in patches of from thirty to fifty, on the upper side of the leaf. The eggs hatch in ten days, but the larvæ develop slowly, maturing in September or even not until October. The larva of *stimulea* is well known for its stinging properties; the nettle-like spines being capable of inflict-

---

*We conceive the "caltropes" (Plate I, fig. 5) to be modified skin spines and the long spines (Plate I, fig. 7) to be modified "caltropes." We trace the following series. In *Euclea indetermina* there are no detachable spine patches, but only "caltropes." *E. pænulata* (*elliotii*) has one pair of patches; *E. delphinii* two pairs, but smaller and less developed than in *Sibine*. The spines also are smaller and have a swollen base, looking like elongate "caltropes." We expect to figure them when we reach *Euclea*. The caltropes are about the same size in all (0.068 mm.), but the spines become larger as they are better developed. In *pænulata* their length is 0.28 mm.; in *delphinii*, 0.56 mm. and in *stimulea* 0.89.

ing quite a severe pain and retaining this power even when spun into the cocoon.

CRITICISMS OF PREVIOUS DESCRIPTIONS.

We have given a list of eleven descriptions or figures of this larva. All but one of them treat of the general characters of the larva, principally the mature larva. Harris' figures are probably the best, though far from exact. Dr. A. S. Packard in 1893 gave the first account of the life history, though but partially, with figures of structural details. His figure of stage I is incorrect in two respects. He represents three rows of tubercles on joints 3 to 5, where there are but two, and shows the spiracle on joint 5 in line with the others with a tubercle above it, whereas there is really no tubercle there and the spiracle is not in line (compare our figure, Plate I, fig. 1). Dr. Packard has well figured the principal other structural elements except the long detachable spines (Plate I, fig. 7). These are one of the most noticeable elements; but we have seen no exact published account of them. Harris calls them "deep purplish red, velvet-like spots;" Packard mentions them as "a pair of rust brown flattened branches of singular spinules" and Dyar refers briefly to an "elevated brown structure like many spines close together" in his general description of the mature larva. The Rev. J. L. Zabriskie has exhibited preparations of these spines to the New York Entomological Society, but the minutes of the meeting have not been published.

Dr. Packard describes the several stages as if there were but five. He appears to have had stage I, stage IV toward the end of the stage, stage V (described twice) and stage VIII, the last; but he has numbered them consecutively.

raised, but very distinct. Surface smooth and level, or a little grooved longitudinally from shrinking. Dimensions 1.8 x 1.2 x 0.1 mm.

The embryo lies curled on its side, the head and tail touching, greatly flattened laterally. Before hatching it shortens and thickens, the egg swells up so as to be much higher than before and the larva emerges through a small hole which it eats in the shell.

Stage I.—(Plate I, fig. 1). Shape essentially as in the mature larva. The horns only grow a little after hatching, being distinct before. Tubercles of the subdorsal row (tubercles i+ii), of lateral row (iii), each with three setæ, all raised on conical projections of the body (Plate I, fig. 3) forming horns; those on joints 3, 4, 5, 11 and 12 of the subdorsal row about twice as long as the others. Lateral row on joints 3, 4, 6, to 12, subequal. Subventral row represented by small setæ. Joint 2 not retracted below joint 3 even when walking, setiferous. Cuticle smooth, without spines. Color entirely light yellow, without marks, the horns a little whitish. Head concolorous with the body, clear yellow; ocelli brown; width .3 mm. (calculated .25 mm.). Length on hatching 1.3 mm.

The larvæ do not feed in this stage, but after hatching and eating a portion of the shell become quiescent and molt in two days.

Stage II.—Horns densely spined with many sharp stiff bristles, as in the mature larva (Plate I, fig. 4). The subdorsal on joints 3 to 5, 11 and 12 longer than the others, but rather shorter conic than before; joints 6 to 10 with only one or two short setæ, the tubercles rudimentary. Lateral row moderately developed on joints 3 and 4, smaller on joints 6 to 12, the spines less numerous than on the subdorsal horns, some of them hair-like. Spiracles moderately distinct, arranged as in the figure of stage I. Color whitish yellow without marks. Segments distinct, skin smooth, with just an indication of granulations. Magnified 350 diameters, this appears as an irregular puncturing or confused shagreen of the surface, but indistinct. Joint 2, as in the previous stage. Head pale yellow, ocelli black, mouth brown; width .4 mm. (calculated .35 mm.). Cervical shield is distinct, dark, bisected, level with the skin. Toward the end of the stage, a whitish line appears along the subdorsal ridge, defined by black dots inwardly and a black line outwardly on joints 6 to 10; the horns become shaded with blackish, and the space between them crossed by transverse lines. Length of the larva, 1.3 to 2 mm.

Stage III.—(Plate I, fig. 2, diagram of the markings). Elliptical, highest through joints 4 and 5, diminishing posteriorly; ridges not sharp, all rounded; subdorsal processes fleshy, hornlike, those on joints 3, 4, 5, 11 and 12 long, densely spined, on joints 7, 8 and 9 very short, consisting of a wart with three or four spines, rudimentary on joints 6 and 10, short on joint 13. Lateral row on joints 3, 4, 6 to 12, moderate, spined, those on joints 3 and 4 slightly larger than the others; on joint 13 a few spines. Subventral edge scarcely ridged, setiferous. Skin closely covered with minute spinulose granules, close set, without tubercular bases, a little sunken in places corresponding to the usual depressed areas, especially in the dorsal intersegmental ones, but obscurely, and the areas are scarcely distinguishable. The color is subject to some variation in different examples. When well developed, the color is light green, the horns translucent whitish, except the subdorsal on joint 4 which has a faint vinous tinge, on joint 5 dark purplish vinous, and on joint 11 pale purple. A waved black subdorsal line, the pair connected by shaded streaks over the dorsum on joints 3, 4, 5 and 11, about two on each segment, leaving square or rounded patches of the ground color between the pairs of horns, that on joint 5 distinctly round. Subdorsal band broken on joints 6 to 10 (Plate I, fig. 2) and on joints 7 to 9, bordered above by a white band, the dorsal space here filled in with a blackish shade, which forms an elongated patch. Posterior end of the body and lateral region immaculate. Head green, shaded with brownish below, eyes black; width .5 mm. Length of the larva 2 to 3 mm.

Stage IV.—Essentially as before, the markings better defined. Dorsal intersegmental depressions small, paired, or single next to the large horns, at the base of which is indicated a paired addorsal segmental row. Horns of both rows on joints 3 and 4 pale flesh pink, the subdorsal on joints 5 and 11 purple, on joint 12 yellowish, the rest

Stage V.—Horns shorter than before at first, but they grow considerably during the stage, spines longer; the rudimentary horns on joints 6 to 10 smaller. Armature essentially as before. Color essentially the same. Horns on joints 3 and 4 flesh-colored, subdorsal on joints 5 and 11 dark purple brown, this color covering joints 3 to 5 as far as the lateral horns and joint 11 below the subdorsal horn and the dorsal patch on joints 7 to 9, which is bordered as before. A yellow dorsal spot between joints 6 and 7, and 9 and 10; a distinct round yellow dorsal spot on joints 5 and 12, a white subdorsal patch on joint 12 as before. The rest of the dorsal and lateral areas bright yellowish green, the lateral ridge and subventral area colorless. Two intersegmental lateral depressions can now be distinguished beside the dorsal ones. Subdorsal horns on joints 12 and 13 colorless like the lateral ones, above which a straight white line is separated from the green lateral area by a dark transparent line. A faint white line on the subventral ridge. Width of the head 1 mm.; length of the larva 5.5 to 9.5 mm.

Stage VI.—(Plate I, figs. 17 and 18). Similar to the preceding. Patches over the large horns and adjacent, brown, shading darker at the edges; the anterior one covering the lateral horns, the posterior the subdorsal horns on joint 11 and surrounding the white patch between joints 11 and 12; a small dorsal linear spot on joint 4, a round one on joints 5 and 11, yellow. Green dorsal blanket-like patch reaches to the lateral horns extending over joints 6 to 10 and running back laterally beneath the subdorsal horns to end in a point on joint 12. It is edged with black and white in the following manner: A subdorsal crimson brown dash on joints 6 and 10, a dusky band above the lateral horn; central elliptical patch crimson brown, blackish at the edge, then crimson, bordered with white and laterally by a crimson brown line. Between the subdorsal horns of joints 11 and 12 a large rounded pentagonal white spot. Horns on joints 3 and 4 fleshy brown, the subdorsal on joints 5 and 11 purplish brown, 3.5 to 6 mm. long, the rest colorless. Body rounded rectangular in dorsal aspect, the ends larger than the middle; subdorsal ridge evenly rounded over, lateral ridge prominent, subventral space very small, colorless, a white line along the subventral edge. Depressed areas very small, forming slight hollows, the dorsal and two lateral intersegmental rows present, the rest not distinguishable. Skin smooth to the naked eye, under a strong lens seen to be densely covered with pointed conical skin spines, dark or colorless according to the ground color, elongated on the horns. Spines stiff, straight and smooth, black tipped, reddish on the long horns, colorless on the short ones. Width of the head 1.4 mm. (calculated 1.47). Length of the larva 9.5 to 13 mm.

Stage VII.—As in the preceding stage. Stage VII differs from the last stage (VIII) as follows: The horns are longer (compare figs. 10 and 9) and their skin spines shorter (Plate I, figs. 22 and 13). The purple brown color is less extensive, being absent from the subventral area and the posterior end of the body, confined to the regions described above, and its tint is rather paler. The patches of "caltrope" spines are present, but smaller than in the last stage and there are no tufts of detachable spines. The long horns grow from 3.5 mm. to 5.8 mm. during the stage and are suddenly shortened to about 2 mm. at the last molt. Width of the head 2 mm.; length of the larva 13 to 18 mm.

Stage VIII.—(Plate I, fig. 16). Head beneath joint 2, but 2 not beneath 3; joints 3 and 4 somewhat folded. Dorsum rises nearly perpendicularly in front, rounds over at joint 5, slopes gently and slightly to joint 11, and is then nearly perpendicular to the anus. No subdorsal ridge, the body evenly rounded, the sides almost perpendicular. On joints 3, 4, 5 and 11 a pair of suborsal fleshy processes, furnished with long stiff spines, salmon colored with black tip (Plate I, fig. 4); among them a very few spatulate setae (Plate I, fig. 14). The processes on joints 3 and 4 are short, those on joints 5 and 11 long (2 to 3.5 mm.), on joint 12 small and still smaller on joint 13. A similar lateral row on joints 3, 4, 6 to 12, all short. On joint 12, above the lateral process, and on 13 anterior to it, is an elevated velvety brown spot, composed of closely set, detachable spines (Plate I, figs. 7, 23 and 24; fig. 8 shows the appearance of the skin after these spines are detached). These spines have a pale yellowish shaft and brown-black tip. Body smooth to the naked eye, under a lens finely spinulose (Plate I, figs. 11, 12 and the anterior corners cut off, 2 mm. wide. A fold runs across joint 2 obliquely from the anterior corner of the cervical shield backward above the spiracle. Two hairs subventrally (iv + v) on every segment except joint 2. Thoracic feet small, colorless, with a terminal brown claw. About eight setae on the suranal lobe and seven on each paranal lobe, the latter not different from those just assigned to the subventral row. Subdorsal tubercules represented by tiny spines on joints 6 to 10, as in the previous stage. On the upper side of the lateral horns on joints 6 to 11, near the tip, are a series of patches of minute detachable spines, designated "caltropes" by Dr. Packard. (Plate I, fig. 5.) A few are also found among the detachable spines at the end of the body, but of a somewhat different shape. (Plate I, fig. 6.) The length of these "caltropes" is about .07 mm. Length of the larva 16 to 23 mm.

Cocoon.—(Plate I, fig. 19). With the characters of the group.

EXPLANATION OF PLATE I.

(Sibine stimulea.)

1. Larva in stage I, enlarged.
2. End of stage III, a diagram showing the genesis of the markings of the central dorsal area.
3. A horn of stage I, 175 diameters.
4. A permanent spine (seta) of a long horn × 50.
5. A "caltrope" from a lateral horn × 175.
6. A "caltrope" from among the detachable spines × 175.
7. A detachable spine × 50.
8. Skin after the removal of the detachable spines × 175.
9. Diagram of front view of larva, stage VIII.
10. Diagram of front view of larva, stage VII.
11. A seta of the rudimentary subdorsal horn of joint 8 with the adjacent skin spines × 50.
12. The same region × 175, showing the skin spines enlarged.
13. The skin spines on a horn × 175.
14. A solitary spatulate seta from the end of the subdorsal horn of joint 5 × 175.
15. *Sibine stimulea.*
16. Mature larva.
17. Larva stage VI, natural size.
18. The same, dorsal view.
19. Cocoon.
20. A group of eggs as laid on the leaf.
21. Feeding traces of the larva at the first period of eating.
22. The skin spines on a horn, penultimate stage × 175.

23, 24. Base and apex × 175 of the spine shown in fig. 7.

Figures 15 to 21 by Miss Morton, the rest by Dr. Dyar.

SYNOPSIS OF THE SPECIES OF NYSSON INHABITING AMERICA, NORTH OF MEXICO.

By WILLIAM J. FOX.

Handlirsch's monograph of this genus is, unfortunately, as far as the American species are concerned, not as complete as his papers on the allied genera. This is accounted for by the scarcity of American material at his command, he having had but eight of the twenty-one species then known from this region, two of which were described by him for the first time. This lack of material probably accounts for the absence from his paper of synoptic tables of our species; and it is hoped the present paper will remedy this want. To be sure, our species were tabulated by Cresson in 1882, but as our knowledge of characters, both specific and sectional, has been increased since then, the present paper can hardly be considered superfluous.

The Tribe Nyssonini consists of the genera *Alyson*, *Didineis* and *Nysson*, of which the two former were tabulated in 1894 *

FEMALES.

1. Hind tibiæ more or less serrated 2
   Hind tibiæ not serrated 4
2. Metanotum (postscutellum) bilobate; size rather large; abdomen black, with yellowish maculations 3
   Metanotum without lobes; size small; first two segments of abdomen red. **solani.**
3. Legs red .... **texanus.**
   Legs black .... **fuscipes.**
4. Submedian (anal) cell of hind wings terminating somewhat beyond, or at the origin of the cubital vein 5
   Submedian cell of hind wings terminating before the origin of the cubital vein 11
5. Scutellum margined, though not strongly, at the sides, covered with large, sparse, shallow punctures (spots on first abdominal segment largest)...... 6
   Scutellum not margined at the sides, strongly, and usually closely punctured. 8
6. Second ventral segment at the base truncate, viewed from the side almost forming a right angle .... **spinosus.**
   Second ventral segment otherwise formed.................................... 7
7. Pygidial area broad, subtruncate at tip, with large, somewhat confluent punctures; lateral spots of first dorsal segment covering almost the entire segment.................................... **plagiatus.**

---

* Entomological News, VII.

Pygidial area narrower, rounded at tip, longitudinally rugoso-punctate; lateral spots of first dorsal segment confined to apical portion of the segment, transverse .... **æqualis.**

8. Clypeus bituberculate at apex; punctuation of the head and thorax very coarse, almost rugose (medial and hind femora more or less red) .... **compactus.**

Clypeus not tuberculate; punctuation strong, but rather close and not rugose. 9

9. Abdomen not at all red 10

Abdomen with the two basal segments more or less reddish (punctuation of head and thorax very close, appearing granular; punctuation of abdomen subtile). **rusticus.**

10. Punctuation of head and dorsulum distinctly separated, that of the abdomen strong and very distinct .. .. **lateralis.**

Punctuation of head and dorsulum, particularly the former, very close, that of abdomen rather subtile, most distinct on first segment............. **fidelis.**

11. Scutellum distinctly margined laterally................................ 12

Scutellum not margined laterally.. 15

12. Abdomen not at all reddish.......... 13

Abdomen reddish basally.................................... 14

13. Basal enclosure of middle-segment with coarse, irregular ridges, thereby making the enclosure reticulate; abdominal punctures strong, but not very deep. . **opulentus.**

Basal enclosure of middle-segment with the ridges regular, longitudinal on basal two-thirds, then oblique; abdominal punctures deep...... **mellipes.**

14. Scutellum coarsely rugoso-punctate; wings clear; a yellow line on pronotum and scutellum .... **bellus.**

Scutellum with coarse, longitudinal folds; wings subfuscous; no yellow on pronotum or scutellum (punctuation of head and dorsulum unusually coarse). **basilaris.**

15. Black, with pale markings; a divided tubercle between the ocelli; punctuation of head and thorax strong and separated .... **albomarginatus.**

Black, with abdomen red; space between ocelli not tuberculate; punctuation of head and thorax very close and rather fine...................... **bicolor.**

MALES.

Hind tibiæ more or less serrated; last dorsal segment 4 dentate 2

Hind tibiæ not serrated; last dorsal bidentate 3

2. Legs red .... **texanus.**

Legs black .... **fuscipes.**

3. Second ventral segment truncate at base, viewed from the side almost forming a right angle.. **spinosus.**

Second ventral segment otherwise formed.............................. 4

4. Submedian cell (anal area) terminating beyond or at the origin of the cubital vein 5

Submedian cell terminating before the origin of the cubital vein 13

5. Last dorsal segment ciliated between the teeth 6

Last dorsal segment not ciliated between the teeth........................ 7

6. Last dorsal segment not prominent between the teeth, subtruncate; lateral spots on first dorsal segment large, covering almost the entire segment. **plagiatus.**

Last dorsal segment prominently angulate between the teeth; spots on first segment transverse, confined to apical portion of segment .... **æqualis.**

7. Clypeus bituberculate at apex; punctuation of head and thorax very coarse almost rugose (hind femora, in part, reddish)................ **compactus.**

Clypeus not tuberculate at apex..8

8. Abdomen not at all reddish 9

Abdomen reddish basally (clypeus and scape beneath yellow; abdomen with sparse, shallow punctures).................................. **rusticus.**

9. Apical antennal joint scarcely enlarged or curved, obtuse at apex, the preceding joint not produced at apex beneath (tegulæ black; dorsulum rugosely punctured; punctures of abdomen distinct but feebler than in *lateralis*). **simplicicornis.**

Apical antennal joint enlarged, strongly curved, truncate at apex, the preceding joint produced somewhat beneath at apex 10

10. Clypeus and scape yellow (punctures of abdomen rather subtile) 11

Clypeus black...12

11. Antennæ short, stout, when stretched back not reaching the tegulæ; form rather robust, tegulæ dark.................................. **tristis.**

Antennæ longer, slenderer, when stretched back reaching, or almost reaching, the tegulæ; form narrower; tegulæ pale-testaceous, or with a yellow spot. **fidelis.**

12. Abdomen with unusually strong punctures, those of the front distinct and separated; scutellum marked with extremely large, sparse punctures. **lateralis.**

Abdomen subtilely punctured; punctuation of front close, so that it has a granular appearance; scutellum coarsely rugose.................... **subtilis.**

13. Apical antennal joint obliquely truncate at tip, more or less curved.........14

Apical antennal joint rounded at tip, or obtusely truncate, not or scarcely curved; markings white; first segment with a continuous fascia. **albomarginatus.**

2. **Nysson fuscipes** *Cress.*

Paranysson fuscipes CRESSON, Tr. Am. Ent. Soc. IX, p. 274, ♂ ♀.

Nysson fuscipes HANDLIRSCH, l. c. p. 301; pl. 4, f. 23.

Washington; Oregon; California. As pointed out by Handlirsch, this species seems confined to the extreme Western States, in fact, those bordering on the Pacific Ocean.

3. **Nysson solani** *Ckll.*

Nysson solani COCKERELL, Tr. Am. Ent. Soc. XXII, p. 294, ♀.

Las Cruces, New Mexico (Cockerell). This species has the hind tibiæ serrated, agreeing in that respect with the two preceding species, but the metanotum is not lobed. It seems to be isolated from the other species as far as its relationship is concerned. The only known specimen lacks the second (petiolated) submarginal cell, which deficiency I consider to be but an anomaly.

4. **Nysson spinosus** *Forster.*

Sphex spinosa FORSTER, Novæ Species Insect, p. 87.

Nysson spinosus HANDLIRSCH, l. c. p. 337, pl. IV, f. 5, 17, 25–28, pl. V, f. 11. ♀ ♂. (For full synonymy see this work.)

North America (Handlirsch). I have only seen European specimens for which I am indebted to Herr F. F. Kohl, of Vienna.

5. **Nysson plagiatus** *Cress.*

Nysson aurinotus PACKARD (non Say), Proc. Ent. Soc. Phila. VI, p. 440, ♂

Nysson plagiatus CRESSON, Tr. Am. Ent. Soc. IX, p. 276, ♂ ♀; HANDLIRSCH. l. c. p. 348, pl. 4, f. 11, 21, pl. 5, f. 10.

Illinois; Indiana; Louisiana (Handlirsch); Texas; Washington. Our largest species.

6. **Nysson æqualis** *Patt.*

Nysson æqualis PATTON, Can. Ent. XI, p. 212, ♂; HANDLIRSCH, l. c. p. 350, pl. 4, f. 10, 22, ♀ ♂.

Massachusetts (Patton); Camden County, New Jersey (in July); Baltimore, Maryland, and South Carolina (Handlirsch); Georgia, Illinois.

7. **Nysson aurinotus** *Say.*

Nysson aurinotus Say, Boston Journ. Nat. Hist. I, p. 368; HANDLIRSCH, l. c. p. 353, ♂, pl. 5, f. 13.

Indiana (Say); Illinois (Handlirsch). Unknown to me.

8. **Nysson Frey-Gessneri** *Hdl.*

Nysson Frey-Gessneri HANDLIRSCH, l. c. p. 355, ♂, pl. 5, f. 12.

Georgia (Handlirsch). Unknown to me.

9. **Nysson compactus** *Cress.*

Nysson compactus CRESSON, Tr. Am. Ent. Soc. IX, p. 278, ♀ ♂.

Washington State.

10. **Nysson tristis** *Cress.*

Nysson tristis CRESSON, Tr. Am. Ent. Soc. IX, p. 281, ♂.

Washington State.

11. **Nysson lateralis,** *Pack.*

Nysson laterale PACKARD, Proc. Ent. Soc. Phila. VI, p. 440, ♂.
Nysson lateralis PATTON, Can. Ent. XI, p. 213, ♀.

Canada (Provancher); Maine, New Hampshire, Virginia, Illinois (Patton).

12. **Nysson subtilis,** sp. nov.

♂.—Cheeks margined posteriorly beneath, coarsely punctured; front closely punctured, appearing strongly granular, feebly ridged above antennæ; between ocelli flat, not tuberculate; clypeus strongly punctured, transversely depressed before apical margin, the latter subtruncate; antennæ stout, scape shining, strongly punctured, flagellum opake, the last joint curved, nearly as long as the three preceding united, obliquely truncate at tip, preceding joint slightly produced beneath at apex; dorsulum with strong, tolerably well separated, punctures; scutellum rugose, no margined laterally; mesopleuræ strongly rugoso-punctate; middle-segment with the spines sharp, slenderer than in *lateralis*, enclosure longitudinally and somewhat irregularly ridged; hind tibiæ not spinose; wings subhyaline, nervures dark, petiole of second submarginal cell a little shorter than the height of cell, submedian cell of posterior wings terminating a little beyond the origin of the cubital vein; punctures of abdomen subtile, much feebler than in *lateralis*, stronger on first segment, second ventral strongly convex, particularly toward the base, but not truncate anteriorly, last dorsal bidentate as in the allied species. Black, the tubercles, and a transverse spot at each side of the first three dorsal segments, yellow; tarsi and anterior

15. **Nysson rufiventris** *Cress.*

Nysson rufiventris CRESSON, ibid, p. 283, ♀.

Montana; Colorado.

16. **Nysson fidelis** *Cress.*

Nysson fidelis CRESSON, ibid, p. 282, ♀ ♂.

Montana; Colorado.

17. **Nysson simplicicornis,** sp. nov.

♂—Cheeks not margined posteriorly beneath, rather finely punctured; front with distinct, somewhat separated and strong, punctures, slightly prominent above the antennæ; between ocelli flat, not tuberculate; clypeus transversely depressed before apical margin, which is subtruncate; antennæ slenderer than in the allied species scape shining, punctured, flagellum opaque, the apical joint not curved or enlarged, obtuse at tip, the preceding joint not at all produced at apex beneath; dorsulum with coarse shallow punctures, or rugoso-punctate; scutellum coarsely punctured, not margined laterally; mesopleuræ coarsely punctured but less so than the dorsulum; middle segment with the spines sharp, slender, enclosure irregularly ridged; hind tibiæ not spinose; wings sub-hyaline, nervures and stigma black, petiole of second submarginal cell shorter than the height of cell, submedian cell of posterior wings terminating at the origin of the cubital vein, punctures of the abdomen distinct, finer and closer, however, than in *lateralis*, second ventral segment strongly convex, with the punctures sparser, last dorsal bidentate. Black; spot at apex of four anterior femora beneath and on dorsal segments 1–3, whitish; mandibles reddish medially; tarsi somewhat testaceous; clypeus and sides of face with dense silvery pubescence. Length 5 mm.

Ingham County, Michigan (G. C. Davis), July 17th. Smaller than the allied species with black abdomens and is at once separated by the different terminal antennal joint.

18. **Nysson opulentus** *Gerst.*

Nysson opulentus GERSTÄCKER, Abh. Naturh. Gesell. zu Halle, X, p. 114, ♂

Nysson opulentus CRESSON, Tr. Am. Ent. Soc. IX, p. 279, ♀.

Nysson opulentus HANDLIRSCH, l. c. p. 357, ♀ ♂.

New York. The ♂ I have not seen.

19. **Nysson mellipes** *Cress.*

Nysson mellipes CRESSON, Am. Ent. Soc. IX, p. 279, ♂ ♀.

Colorado; Dakota; Montana.

20. **Nysson tuberculatus** *Hdl.*

Nysson tuberculatus HANDLIRSCH, l. c. p. 363, ♂ ♀.

Wisconsin and South Carolina (Handlirsch). Unknown to me. It is said to be close to *basilaris*, but seems to differ somewhat in the punctuation of abdomen, greater extent of black on legs and presence of pale spots on scutellum. I am inclined to regard *basilaris* and *tuberculatus* as synonymous, however.

21. **Nysson basilaris** *Cress.*
Nysson basilaris CRESSON, Tr. Am. Ent. Soc. IX, p. 281, ♀.
Georgia.

22. **Nysson bellus** *Cress.*
Nysson bellus CRESSON, ibid. p. 280, ♀.
Montana and Texas.

23. **Nysson pumilus** *Cress.*
Nysson pumilus CRESSON, ibid. p. 405, ♂.
Nevada.

24. **Nysson albomarginatus** *Cress.*
Nysson albomarginatus CRESSON, ibid. p. 278, ♂ ♀.

Nevada. Easily distinguished by the pale, continuous fasciæ of abdomen. The unique ♀ type has also two, tranverse, pale spots on first segment, near base. These may not be constant in a series, however.

25. **Nysson mœstus** *Cress.*
Nysson mœstus CRESSON, ibid. p. 280, ♂.
Washington State.

26. **Nysson bicolor** *Cress.*
Hyponysson bicolor CRESSON, ibid. p. 284, ♀.
Nysson bicolor HANDLIRSCH, l. c. p. 402.

Washington State. The unique type of this species lacks the third submarginal cell.

These locusts belong to a group, the Œdipodinæ, usually given subfamily rank, of which fifteen species are found in New England. One of the best known and most widely distributed of these in eastern North America is a species whose wings are black with a pale buff outer border and with a few spots at the tip; this is the Carolina locust. It is very common on dusty roadsides and waste places in the latter part of summer and the early autumn. Owing to the prevailing tint of quiet brown which clothes the majority of individuals they are known in some localities as "Quakers."

Just how the rattling sound is produced is a matter of some speculation; it is, however, entirely under the control of the insect, which can produce it or not at will. So far as recorded, only the male stridulates, though I suspect that the females of some species occasionally do in a less degree. Owing to the noise being produced in flight it is difficult not only to observe the exact method of its production, but also to determine with certainty that it is confined to one sex. It is usually stated to be caused by the striking of the front edge of the wing against the under side of the wing-cover. This might occur as the result of an up-and-down blow or, as I venture to suggest, of a slight antero-posterior movement bringing the prominent veins of the under side of the wing-cover (humeral trunk and ulnar or anal veins) into collision with the raised veins of the base of the wing.

Certain species, however, produce not only rattling, but distinct snapping sounds consisting of separate loud snaps or clacks, *e. g.*, *Circotettix verruculatus*, which often dances up and down in the air while doing so and not infrequently ends its powerful and erratic flight with a rattle immediately before alighting. It has seemed to me that the clacks may be produced in a different manner from the rattling sounds, and the following is suggested as a possible explanation.

If the wing-cover of any of our larger Œdipodinæ be examined there will be readily seen near its point of attachment, about in its midline, between the bases of two of the conspicuous veins (humeral trunk and anal) and pressing them apart, as it were, a distinct prominence. From this spring the two ulnar veins. If the wing-cover be inverted a depression will be found corresponding to the external prominence. In this depression lies the elevated base of the median vein of the wing when the wings and wing-covers are closed, and this arrangement holds these organs in place in the position of rest without any direct effort of the insect. If the wing-cover of a newly killed or relaxed Œdipodine be properly manipulated it will leave its place with a distinct snap, due to the sudden slipping off of the base of the wing-cover from the base of the wing. This arrangement is highly developed in the genus *Circotettix*, whose members are noted for the clacking noise produced in flight, which it seems to me may perhaps be thus produced by the sudden, and more or less rapidly repeated, opening and closing of the flight-organs.

There is another group of locusts found with us, fewer in species, smaller in size, and of less conspicuous habits, but more plentiful in numbers than the Œdipodinæ, which stridulate not during flight, but when at rest,—these are the little oblique-faced Tryxalinæ. In this group the sound is produced by rubbing the hind thighs against the wing-covers, and both the apparatus and its working are readily observed. It consists, in most of our species, of a row of fine teeth projecting from the inner side of the hind thighs of the male in such a position as to engage the elevated veins of the basal part of the wing-covers, by this means setting up vibrations in the latter. This may be readily demonstrated in the fresh insect or a relaxed specimen. The sounds produced in this way are entirely different in character from those made by the Œdipodinæ in flight, being a scraping or scratching, as distinguished from a rattling, crackling, or rustling.

There is, however, a genus (*Mecostethus*) of this group which is allied to the Œdipodinæ in structure, and the males of one of its species produce the loudest note made by any of our Tryxalinæ. In this genus the hind thighs of the males are destitute of teeth, which are borne instead upon a supernumerary vein of the wing-covers, which is raised above the others. In the species referred to the teeth on this vein are high and very acutely pointed.

This additional vein is found in all our representatives of the they had evidently but just become sufficiently warmed by the morning sun to take an active part in life, and in consequence allowed a closer approach than is the usual custom of this wary species. Two of them seemed more wide awake than the others, and as they crawled about would occasionally stop, slightly elevate the hinder part of the body and rapidly move the hind thighs up and down against the wing-covers, producing a distant "scritching" sound clearly audible at a distance of three or four feet. This act was repeated several times at intervals of a few seconds. No females were seen near by.

Desiring to make further observations on this mode of stridulation in the Œdipodinæ I secured one day after my return several examples of *Encoptolophus sordidus* and *Arphia xanthoptera* and enclosed them, together with some grass, in a pasteboard box of about a cubic foot capacity, covered it with netting and placed it in the sun. Both sexes of both species were represented, but of females there were but two of each.

At first their efforts were entirely in the direction of escape, but after a short time they became more quiet and were left by themselves, an occasional approach being made to see how matters stood. Nothing of interest was learned from the Arphias, but after some time two males of *E. sordidus*, oblivious to their surroundings, became attentive to one of the females. Aroused by her near presence they crawled rapidly about, and as they approached her would stop, stridulate for a second with their hind thighs, and excitedly leap toward or upon her, when, being repulsed, they would repeat the operation. The sound produced was a very high-pitched "ĭ′chĭ-ĭ′chĭ-ĭ′chĭ-ĭ′chĭ."

Another sound of an entirely different character was made by them in a different manner. The hind thighs, instead of being closely applied to the wing-covers, were spread somewhat apart and violently vibrated, moving, as nearly as could be judged, up and down with extreme rapidity and striking as they did so upon the bottom of the box. The sound produced was a peculiar "r-r-r-rd" or "r-r-r-rt," low in tone and of considerable volume, leading me to think from its quality that it was due in part to the vibration of the pasteboard bottom. Once it seemed as if the wing-covers took some part in it, vibrating laterally; but as the act was witnessed but twice, both times from the side, and was too rapid for the eye to follow, I am uncertain of the exact method of its production.

Lack of time in suitable weather prevented further observations, but these are reported in the hope of bringing out information on the subject and inducing other observers to pay some attention to this interesting habit.

The occurrence in the Œdipodinæ of stridulation when at rest seems to have been entirely overlooked in late years, though observed by Yersin in *Œd. fasciata*. Among the Acridinæ *Caloptenus italicus* and *Melanoplus femur-rubrum* have been observed by Yersin and Scudder respectively to perform the stridulatory movements, though no sound was noted in either case. Yersin was disposed to believe that all locusts provided with well-developed wing-covers execute such movements, whether accompanied by sound or not. And it is not unlikely that sound is often produced too faint or fine for our ears to perceive.

Nothing is known of stridulation in the Tettiginæ, but it seems possible that it may occur in the same manner, *i. e.*, by friction of the hind thighs on the side of the pronotal process or anterior edge of the wing which in this group take the place of the wing-covers. In the Eremobinæ *both* sexes are said by Saussure to be often provided with special musical apparatus of two kinds, one used at rest and one in flight and both differing from those here mentioned.

BOTH SIDES OF BUTTERFLIES.

By A. P. MORSE, Wellesley, Mass.

Every collector of butterflies and every student of variation in these insects is interested in methods whereby both surfaces of the wings of his favorites can be studied with a minimum amount of labor and inconvenience. Book-boxes, so-called, with glass top and bottom and cork gummed to the glass, answer very well in a permanent collection, but for one which is receiving additions and to whose owner expense is an item to be closely considered, so that an entire case or cases cannot be given up to a species, some method is necessary which will more readily permit of rearrangement when desired. With this end in view I several years ago designed the following plan, which is here presented in the hope that it will be of interest or use to others. While metal strips filled with cork have been used for some time I believe that the method of rearrangement suggested is entirely novel.

The cases for which the plan was designed are of the standard museum pattern, 16 x 19 x 3 inches outside, 15 x 18 inside measurement, the top and bottom of glass, the sides of wood joined by tongue and groove, the tongue being either of wood or metal. The plan, however, is applicable to almost any form or size of case preferred. Aside from its increased weight a glass bottom, as well as top, is to be preferred for all cases of considerable size, as it does away with the troublesome shrinking which is inseparable from the use of large sheets of wood unless made in three-ply, as in the manufacture of desks, etc.

The method is this: Procure twice as many thin strips of some straight-grained wood with as little tendency to warp as possible, such as cherry or basswood, one-quarter inch in thickness, as long as the inside measurement of the front of the case and as wide as the case is deep inside. On one side of these strips are sawed, with a fine saw, slots one-fourth inch in depth at intervals of half an inch. Two strips will be needed for each case (front and back), making twice as many strips as cases, one-half of which should have the first slot sawed at a distance of one-half inch from the end, the other half at a distance of three-quarters inch; the reason for this will be seen later. These strips may be procured at slight expense from the maker of the cases or a box manufacturer.

Next, get a reliable tinsmith to cut some strips of tin three-quarters inch wide and fourteen and seven-eighths inches long and bend them up into troughs one-fourth inch wide and deep with vertical sides. To one side of each end of a trough should be soldered neatly the short end of an L-shaped piece of the same material one-fourth plus three-fourths inch long and nearly one-fourth inch wide. These lie flat upon the bottom of the case out of sight beneath the wooden strip and act as feet to hold the trough upright during rearrangement. To give as much supporting surface as possible they should be attached to opposite sides of the trough. The portion of the side of the trough opposite the attached piece should be cut through and turned down flat, widening the supporting base, or it may be removed entirely, leaving the end of the trough with a single vertical edge which fits into the slots sawed in the wooden strips. These edges being on opposite sides of the trough necessitate the different position of the slots on the front and back strips previously mentioned. The troughs are then to be filled with strips of cork and the whole to be painted over a dead white or black as preferred. The tin troughs ready to be filled may be obtained for about three cents apiece, in lots of one hundred or more.

The troughs are held in position by the slots sawed in the wooden strips and may be placed within an inch of each other, or within one-half inch in the c[illegible] very small specimens by cutting a little off the [illegible] of the L-sha[illegible] feet, or as far apart as desired. The wooden [illegible] and back of the case by short, headless pins or brads thrust into the sides of the case, and if equal in width to the depth of the case are held down by the cover, or they may be narrower and then held securely in place by a pin above each end.

For examination the case may be placed upon a table covered with white or dark cloth or paper according to the background desired, and may be instantly turned upside down, allowing both sides of the entire series of specimens to be examined when desired without a moment's delay.

◆

A NEW GLOVERIA.

By HARRISON G. DYAR.

Mr. L. O. Howard has sent me several examples of a Lasiocampid collected in Arizona for the Department of Agriculture, which seems to represent an undescribed species. I take pleasure in dedicating it to this well known entomologist.

Dendrolimus howardi, sp. nov.

Female. Like *Quadrina diazoma.* Clay color (Ridgway, pl. V, fig. 8) irrorate with pale chocolate brown scales. Two faint, brown, nearly straight lines, one across the cell, the other at the outer third of the wing, the most distinct mark. A very faint white discal dot. Subterminal line irregular, broken, faint, twice outwardly curved, at veins 3 and 4 and 6 to 8. Secondaries and thorax pale brown, about the tint of the transverse lines of the primaries; abdomen a little paler. Expanse 49 to 66 mm.

Male. Considerably like the male of *D. gargamelle* Strecker (The male of *Q. diazoma* being unknown). Sepia (Ridgway, pl. III, fig. 3), along the outer margin of primaries succeeded by a semi-transparent zone, which shades into raw umber (R. III, 14) over the basal half of the wing, composed of brown and yellow-

Grote, the type of which is rubbed and the faint transverse anterior line and discal spot may have been obliterated, not being mentioned in the description. The wings are, however, clearly not short and broad as described (and as shown also in the photograph before me); but are, as usual, rather long, the outer margin gently convex. The size, too, is much smaller; but the specimens may have been reduced by breeding, although Mr. Howard does not think that this can be the case to any great extent. Otherwise this form is distinct from any in our fauna, nor is there anything like it in the Biologia Centrali-Americana. Mr. Druce and Mr. Schaus have both described several Lasiocampids since the date of the Biologia; but a perusal of their descriptions does not suggest that any of them have to do with the present insect.

Synopsis of the American Dendrolimus ♀ ♀.

- Gray, the subterminal line distinct.
  - Subterminal line sharply and regularly dentate.............................**arizonensis.**
  - Subterminal line undulate, irregular.............................**dolores.**
- Brown-gray to yellowish brown, subterminal line obscure.
  - Dark grizzled gray brown, discal dot white.............................**gargamelle.**
  - Paler, luteous brown, only traces of discal spot.
    - Wings as usual, rather elongate.............................**howardi.**
    - Wings short and broad, depressed at apices.............................**diazoma.**

The following notes, sent me by Mr. Howard, show the dates observed for the emergence of the moths as bred at Washington.

"April 10, 1895. Received from J. W. Toumey, Tuscon, Arizona a web of a Lasiocampid and some partly grown larvæ found feeding on *Quercus emoryi;* only observed on a few trees. Accompanying them was a strip or band of web taken from the tent. Mr. Toumey has been informed that great bands of such web hang from the branches immediately around the tent like long streamers.

The larvæ are bright ferruginous with a yellowish lateral stripe and dull black head.

There are three median dorsal rows of white soft hairs and a lateral row of same color.

April 20th. Larvæ are feeding both on buds just opening as well as on the dry leaves of oak. One tachinid fly issued; it is *Exorista thlecarum.*

July 1st. One larva spun up.

July 10th. One moth, a female issued.

July 16th. Five males issued; two were ruined, the remaining three spread.

July 18th. One female issued; left in cage to copulate.

July 19th. Two females and four males issued. Eggs were deposited in the cage.

July 22d. Three females and five males issued. Two more batches of eggs deposited.

July 23d. Three females and two males issued.

July 24th. One female and one male issued. More eggs were deposited.

July 25th. Two males issued.

July 26th. One female issued.

July 29th. Two issued. (Sex not stated.)

August 2d. Two issued.

August 5th. One female issued. Some of the eggs hatched.

August 8th. One male issued.

August 9th. More larvæ hatched."

The following descriptions have been drawn up from alcoholic specimens preserved at the Department of Agriculture, some of which have been kindly presented to me by Mr. Howard.

Eggs.—Oval; one end bluntly rounded, the other conical, slightly flattened above and below. Pure white, very slightly shining, a small, round, yellowish translucent spot in the centre of each flattened side. (The large end is eaten away in all the specimens, by the young larvæ, so I am not able to describe the micropylar region.)

Length 1.8 mm., width 1.5 mm. and 1.4 mm. through the flattened sides. Shell minutely roughened under a half-inch objective, but without marks. Laid in irregular clusters without any covering.

Stage I.—Head and thoracic feet shining black; cervical shield, white, rather thick, with a series of little short dorsal tufts. Venter dark gray with a series of black medio-ventral spots. Body quite densely clothed with secondary hairs, the warts almost obsolete, some of the largest ones persisting, black. Leg plates dark.

Last stage.—Head black, the lower segment of clypeus, side pieces and median suture whitish; mouth pale; all covered with soft white secondary hairs; rounded, rather large, not retracted; width 5.5 to 6.4 mm. Body curiously transversely streaked with whitish and red-brown, silky hairy, flattened; no warts. There is a rather broad shaded blackish band below the spiracles, relieved by a series of whitish intersegmental patches below, otherwise grading into the dark venter, mottled with black and light red on each side of the median black patches. Above the substigmatal line the marks are transeverse, except a narrow brown-black broken lateral line which cuts them. The ground color is whitish, shading into bright brown subdorsally, with about six obscured transverse streaks of brown black, most distinct intersegmentally. They become clouded in a dark brown shade centrally on the segment and are relieved by an orange subdorsal transverse dash on the posterior third on joints 4 to 12, a rather conspicuous making, defined before by darker brown; an anterior dark brown ad-dorsal patch. These transverse markings are produced by a growth of fine short dark brown secondary hairs in four transverse lines over the dorsum, a broken blackish dorsal and ad-dorsal shading on the ground of the original broad orange-red subdorsal band. At the lower edge of the orange dash a dark red shade obscurely parallels the longitudinal superstigmatal line. Cervical shield velvety black with two white streaks below it. Anal plates black, joint 12 heavily clouded with blackish. Thoracic feet reddish, abdominal dark, with a bright whitish streak down the outer side. Hair soft, fine, white, tufted dorsally and subventrally centrally on the segments. Warts absent, all the hairs secondary; no perceptible enlargement below the cervical shield; joint 12 not enlarged.

The short brown hairs are stiff thick-walled tubes, smooth with pointed conical ends; they are widest at terminal third and taper a little toward the base, minutely granular-roughened just before the tip. The long white hairs are more slender, colorless, thin walled and smooth, gently tapering toward the tip. There is a slight roughening toward the tip of short lamellar points. Length of the short hairs .4 to .6 mm., of the long ones 3 to 6 mm. The short hairs are evidently of a defensive nature as they become detached when the larva is handled and entering the skin produce some irritation and finally small blisters which last for several days.

Cocoon.—Thin, almost papery, of dark brown silk, single, but with some loose silk without; elliptical, less definite in shape than in Clisiocampa, the ends thinner than the central portion. Size 35 x 15 mm.

Pupa.—Robust, the abdomen large, thicker than the thorax, slightly curved ventrally, the anal rounded, pilose, without cremaster, three moveable incisures, viz. 4–5, 5–6, 6–7th abdominal segments (corresponding to joints 8–9, 9–10, 10–11 of the larva) the other incisures behind the 8th abdominal segment distinct, but fixed. Spiracles large, distinct, present on abdominal segments 2 to 8. Cases smooth, compact, firmly united, the joinings marked by darker lines; the leg cases reach to the end of the third abdominal, wing cases to middle of the fourth, antennae cases opposite the end of the fourth segment. Head and thorax pilose, abdomen less distinctly so; cases smooth. Color light reddish brown, the incisures, spiracles and sutures darker. Length 25 mm., width 10 mm.

LITERATURE ON DEFENSIVE OR REPUGNATORIAL GLANDS OF INSECTS.

By A. S. PACKARD.

Aldrovandus, U.—De animalibus insectis libri septem cum singulorum iconibus ad vivum expressis. Denuo impress: Bonon. apud Clementem Ferronium 1638, p. 273. [The first edition was in 1602.]

Moufet, T.—Insectorum sive minimorum animalium theatrum . . London, 1634. pp. 185–186.

Gœdart, J.—Metamorphosis naturalis sive insectorum historia . Amstelodami, 1700. Pars 2, p. 136. [French ed. of 1700, t. 2, p. 162; Lister's Latin ed. London, 1685, p. 60.]

Réaumur, R. A. F.—Mémoires pour servir à l'histoire des insectes . . Paris, 1736, t. 2, pp. 266–269, pl. 21–22. [t. 2, partie 2, pp. 21–23 of the Amsterdam ed. of 1737-1748.]

De Geer, C.—Observation sur la propriété singulière qu' ont les grandes chenilles à quatorze jambes et à double queue, du saule, de seringuer de la liqueur. (Mém. sav. étrang. Paris, 1750, i, pp. 530–531, pl. Goetze und Bonnet, etc. auserlesene abhandlungen, 1774, p. 220.)

Schaffer, J. C.—Neuendeckte theile an raupen und zweyfaltern . . Regensburg, 1754.

Sulzer, J. H.—Die kennzeichen der insekten . . Zürich, 1761, pp. 65–67 pl. 5, fig. 34.

Müller, O. F.—Pile-larven med dobbelt hale, og dens phalaene . . Kjöbenhavn, 1772, pp. 53–56, pl. 2, fig. 3–5.

Amoreux, P. J.—Notice des insectes de la France, réputés venimeux, . . Paris, 1789, pp. 282–285.

Bonnet C.—Mémoire sur une nouvelle partie commune à plusieurs espèces de chenilles. (Mém. math. d. savants étrang. Paris, 1755, ii, pp. 44–52.) Collection complète des oeuvres de C. Bonnet, ii, 1779. pp. 3–16.

——— Mémoire sur la grande chenille à queue fourchue du saule, dans lequel on prouve, que la liqueur que cette chenille fait jaillir, est un véritable acide, et un acide très-actif. (Mém. math. de savants étrang. Paris, 1755, t. 2, p. 267–282. Collection complète des oeuvres de C. Bonnet, 1779, ii, pp. 17–24.)

Schwarz C.—Neuer raupenkalender . Nürnberg, 1791. Abth. 1, p. 59.

Petzhold C. P.—Lepidopterologische beyträge. (L. G. Scriba's beiträge zu der insekten-geschichte, Frankfurt am Main, 1793, heft 3, pp. 230–251.)

Nouvelle Dictionaire d' Hist. Nat. xv, p. 487. (Larva of Hydrophilus ejaculates with a slight noise a fœtid and blackish fluid.)

Rengger, Johann Rudolph.—Physiologische untersuchungen über die thierische haushaltung der Insecten. Tübingen, 1817. (In the chapter entitled Abgesonderte Säfte bei den Raupen, he speaks of the glandular apparatus of the larva of *B. vinula*, noticing the general form of the secretory sack, that it opens out in two muscular evertible points, out of which the secretion is ejected.)

Kirby and Spence.—Introduction to entomology . . 2d. ed. i. 1815, London, 1818, ii, pp. 238–239.

Dufour L.—Mémoiré anatomique sur une nouvelle espèce d'insecte du genre Brachinus. (Ann. de mus. d'histoire nat. xviii, 1811, pp. 70–81.)

——— Recherches anatomiques sur les carabiques et sur plusieurs autres coléoptères. (Ann. d. Sci. Nat. 1826, viii, pp. 5–54.)

——— Mémoire sur les métamorphosis et l'anatomie de la *Pyrochroa coccinea.* Glande odorifique. (Ibid. ii sér. Zoologie. xiii, 1840, pp. 340–341.)

Lyonet, P.—Recherches sur l'anatomie et les metamorphoses de différentes espèces d'insectes. Ouvrage posthume, publié par M. W. deHaan, Paris, 1832.

Morren, C.—Mémoire sur l'émigration du puceron du pêcher (*Aphis persicæ*), et sur les caractères et l'anatomie de cette espèce. (Ann. Sci. Natur. Zool. 1836, VI, pp. 65–93, pl. 6–7.)

Ratzeburg, J. T. C.—Die forstinsekten . . . Theil I, Die käfer . . 1837, . . . p. 246.

Aubé, C.—[Note sur une sécrétion fétide d' *Eumolpus pretiosus.*] (Ann. Soc. Entom. Fr. 1837, s. 1, t. 6; Bull. p. 58.)

Lacordaire, J. S.—Introduction à l'entomologie, 1838, ii, p. 45.

Meckel, von Hemsbach, Johann Friedrich.—Mikrographie einiger Drüsenapparate der niederen Thiere. (Anat. Phys. u. Wiss. Med. 1846, p. 1–73, pl. 1–3) p.46. Müller's Archiv.

Stein, Friedrich.—Vergleichende anatomie und physiologie der Insekten. Berlin, 1847.

Leidy, Joseph.—History and anatomy of the hemipterous genus Belostoma. (Journ. Acad. Nat. Sci. Philadelphia, Ser. 2, 1847, I, Pt. 1. pp. 57–67. pl. 1.)

——— Odoriferous glands of invertebrata (Proc. Acad. Phila. 1849, iv, 234–236. 1 Pl.). Ann. & Mag. N. H. Ser. 2, 1850, v, pp. 154–156.

Dufour, L.—Recherches anatomiques sur les Diptères. 1851, pp. 195, 313. (Alimentary canal of Sepsis contains the seat of a "glande odorifique.")

Chapuis et Candèze.—Catalogue des larves des coléoptères . . . (Mem- Soc. Sci. de Liège, 1853, viii, pp. 351–653, pl. 1–9, pp. 611–612.)

Siebold, Carl Theodor.—Lehrbuch der vergleichenden anatomie der wirbellosen Thiere, 1848. Burnett's transl. Boston, 1854.

Burnett, Waldo Irving.—Translation of Siebold's Anatomy of the Invertebrates, 1854 (Note on the osmeteria of *Papilio asterias*, which he regards as an odoriferous and defensive, rather than tactile organ, p. 415).

Karsten, H.—Bemerkungen über eininge scharfe und brennende absonderungen verschiedener raupen. (Müller's Archiv für Anat. Phys. u. Wiss. Med. 1848, pp. 375–382, pl. 11–12) describes the poison glands at the base of the spines of Saturnia larvæ.)

——— Harnorgane des *Brachinus complanatus* Fabr. Fig. (Müller's Archiv, 1848, pp. 367–376.

Saussure, Henri de.—Recherches zoologiques de l'Amerique centrale et du Mexique. 6eme Partie. Études sur les Myriopodes et les Insectes. Paris, 1860.

Gerstaecker, C. E. A.—Ueber das vorkommen von ausstülpbaren hautanhängen am hinterleibe an schaben. (Archiv f. Naturgesch. 1861, xxi, pp. 107–115.)

Laboulbéne, Alexandre.—Note sur les caroncules thoraciques du Malachius. (Annales de la Société Ent. de France. 3e Ser. vi, pp. 521–528, 1858).

Liegel, Hermann.—Ueber den Ausstülpungsapparat von Malachius und verwandten Formen. Inaugural Dissertation. Göttingen. pp. 31, 1 pl. [n. d. since 1858 and before 1878.]

Leydig, F.—Zur anatomie der insecten. (Archiv f. Anat. Phys. u. Wiss. Med. 1859, pp. 33–89, 149–183, pl. 2–4) p. 35 and 38.

——— Biolog. Centrabl. x, 1890, pp. 395–396, Ueber bombardier Käfer.

Claus, C.—Ueber die Seitendrüsen der Larve von *Chrysomela populi*. (Zeits. f. Wissench. Zoologie, xi. 1861. pp. 309–314. Taf. xxv.)

——— Ueber schutzwaffen der raupen des gabelschwanzes (Würzburger Naturw. Zeitschrift, 1862, iii, xiv, Sitz. am. 28, Juni, 1862.

——— Ueber die wachsbereitenden hautdrüsen der insecten. (Sitzungsber. gesells z. beförd. d. gesammt. naturw. zu Marburg, June, 1867, No. 8. pp. 65–72.)

Rogenhofer, Alois.—Drei Schmetterlingsmetamorphosen. (Verhandlungen der K. K. zoolog.-bot. Gesellschaft, Wien, xiii, 1862, pp. 1224–30.)

Fitch, Asa.—Eighth report on the noxious and others insects of . . New New York (Trans. N. Y. State Agric. Soc. 1862, xxii, pp. 657–684.), p. 677. [Separate, p. 195.]

Guenée, Achille.—Annales Soc. Ent. de France, Ser. IV, 1867, pp. 606–607. Pl. 13.

Landois, L.—Anatomie der bettwanze, *Cimex lectularius*, mit berücksichtigung verwandter hemipterengeschlecter (Zeitsch. f. Wiss. Zool. 1868, xvii, pp, 206–224, pl. 11–12, p. 218–223.)

Studer, Theodor.—Mittheilungen der naturforsch Gesellschaft in Bern. 1872–'73, No. 792–811, p. 101.

Candéze, E.—Les moyens d'attaque et de défense chez les insectes. (Bull. Acad. royale de Belgique, 2 Sér. xxxviii, 1874, pp. 787–816.)

Mayer, Paul.—Anatomie von *Pyrrhocoris apterus.* (Reichert und du Bois-Reymond's Archiv f. Anat. Phys. etc. 1874, pp. 313–347, 3 Taf.)

Scudder, Samuel Hubbard.—Odoriferous glands in Phasmidæ. (Psyche, i, 137–140, Jan. 14, 1876; Amer. Nat. x, p. 256, April, 1876, drawings shown by W. J. Fewkes to show their structure and position.)

——— Prothoracic tubercles in butterfly caterpillars. (Psyche, i, 168, April 14, 1876.)

——— Organs found near the anus of the ♀ pupa of Danais, which recall the odoriferous organs mentioned by Burnett, transl. Siebold's Comp. Anat. as occurring in Argynnis and other genera. (Psyche, iii, 278, 1882, p. 453, note 22.)

——— [Glands and extensile organs of larvæ of blue butterflies.] (Proc. Bos. Soc. Nat. Hist. xxxiii, p. 357–358, 1888.)

——— Butterflies of Eastern United States. i–iii, 1889.

——— New light on the formation of the abdominal pouch in Parnassius. (Trans. Ent. Soc. London, Dec. 1892, published Jan., 1893, 249–253.)

Müller, Fritz.—Die stinkkölbchen der weiblichen maracujáfalter. (Zeitschr. f. Wiss. Zool. 1877, bd. 30, p. 167–170, pl. 9.)

Helm, F. C.—Ueber die spinndrüsen der lepidopteren. (Zeits. f. Wiss. Zool. 1876, xxvi, pp. 434–469, pl. 27–28.)

Plateau, Felix.—Note sur une sécrétion propre aux coléoptères dytiscides. (Ann. Soc. Entom. Belg. 1876, v, xix, pp. 1–10.)

Edwards, William H.—Notes on *Lycæna pseudargiolus* and its larval history. (Can. Ent. x, Jan. 1878, pp. 1–14. Fig.)

——— On the larvæ of *Lycæna pseudargiolus* and attendant ants. (Can. Ent. x, July, 1878, pp. 131–136.

Voges, Ernst.—Beiträge zur Kenntniss der Juliden. (Zeitsch. f. Wissen. Zoologie, xxxi, p. 127, 1878. The scent glands are retort-shaped bodies, the necks of which open into *foramina repugnatoria.*)

Rye, E. C.—Secretion of water-beetles. (Ent. Month. Mag. xiv, 1877–78, pp. 232–233.

Forel, A.—Der giftapparat und die anal drüsen der ameisen. (Zeits. f. Wiss. Zoöl. 1878, xxx, Suppl. pp. 28–68, pl. 3–4.).

Saunders, William.—Notes on the larva of *Lycæna scudderi.* (Can. Ent. X, Jan. 1878, p. 14. Attended by ants so that the author supposes that it has glands like those described by W. H. Edwards, in the same journal of the same date.)

Weismann, A.—Ueber duftschuppen. (Zoöl. Anzeiger, 26th Aug. 1878, jahrg. i, pp. 98–99)

Gissler, Carl Friedrich.—On the repugnatorial glands in Eleodes. (Psyche, ii, Feb. 1879, pp. 209–210.)

——— [Odoriferous glands on the 5th abdominal segment in nymph of *Lachnus strobi.*] (Fig. 273, p. 804 of Packard's Report on Forest and Shade Tree Insects, 1890.)

Brunner von Wattenwyl, K.—[Ueber ein neues organ bei den acridiodeen.] (Verhandl. k. k. Zoöl. Bot. Gesells. Wien, 1879, xxix; Sitzungsber. pp. 26–27.)

——— Verh. K. K. Zoöl. Bot. Ges. Wien. (A peculiar organ on hind femora of Acrididæ.)

Rougement P.—Observations sur l'organe détonnant du *Brachinus crepitans* Oliv. (Bull. Soc. Sci. Nat. Neuchâtel, 1879, xi, pp. 471–478, pl.)

Goossens, Th.—[Sur une organe entre la tête et la première paire de pattes de quelques chenilles.] (Ann. Soc. Ent. France, ix, p. 4, 1869. Bull. pp. 60–61.)

——— Des chenilles vésicantes. (Ann. Ent. Soc. France (6) Tome vi, p. 461–464, 1887.)

Coquillett, D. W.—On the early stages of some moths. (Can. Ent. March, 1880, xii, pp. 43–46, p 45.)

Chambers, Victor Tousey.—Notes upon some tineid larvæ. (Psyche, iii, July, 1880, p. 67. Certain retractile processes "from the sides of certain segments of the larva.")

——— Further notes on some Tineid larvæ. (Psyche, iii, p. 135, Feb. 12, 1881. Larva of Phyllocnistis has 8 pairs of lateral pseudopodia on first 8 abdominal segments.)

French, G. H.—Larvæ of *Cerura occidentalis* Lint. and *C. borealis* Bd. (Can. Ent. July, 1881, xiii, pp. 144–145.)

Passerini, N.—Sopra i due tubercoli abdomanali della larva della *Porthesia chrysorrhœa*. (Bull. Soc. Ent. Ital. 1881, xiii, pp. 293–296.)

Klemensiewicz, Stanislaus.—Zur näheren Kentniss der Hautdrüsen bei den raupen und bei *Malachius*. (Verhandlungen d. Zool. Bot. Gesellsch. Wien. xxxii, pp. 459–474, 1882, 2 Taf.)

Weber, Max.—Ueber eine Cyanwasserstoffsäure bereitende Drüse. (Archiv für Mikr. Anat. 21 Bd. p. 468–475, T. 24, 1882.)

Bertkau, Philip.—Ueber den Stinkapparat von *Lacon murinus* L. (Archiv f. Naturg. 1882. Jahrg., 48, pp. 371–373.)

Dimmock, George.—Organs, probably defensive in function, in the larva of *Hyperchiria varia* Walk. (*Saturnia io* Harris). (Psyche, iii, pp. 352–353, Aug. 19. 1882. Account of lateral eversible glands on 1st and 7th abdominal segments; they emit neither moisture nor odor.)

——— On some glands which open externally on insects. (Psyche, iii, 387–399, Jan. 15, 1883. Treats of poison glands, glandular hairs, eversible glands of Cerura, etc.)

Coleman, N.—Notes on *Orgyia leucostigma*. (Papilio, Nov.–Dec. 1882.

Künkel, J.—La punaise de lit et ses appareils odoriférants. (Comptes Rendus, ciii, 1886, pp. 81–83. Annals & Mag. Nat. Hist. 5th Ser. xviii, 1886, pp. 167–168.)

Packard, Alpheus Spring.—The fluid ejected by notodontian caterpillers (Amer. Nat. 1886, xx, pp. 811–812.)

——— An eversible "gland" in the larva of Orgyia. (Amer. Nat. 1886, xx, p. 814.)

——— 5th Rep. U. S. Ent. Comm. Insects injurious to forest and shade trees, p. 136, 1890.

——— Hints on the evolution of the bristles, spines and tubercles of certain caterpillars. (Proc. Boston Soc. Nat. Hist. xxiv, 1890, p. 551.)

——— Notes on some points in the external structure and phylogeny of lepidopterous larvæ. (Proc. Bost. Soc. Nat. Hist. xxv, 1890, pp. 83–114.)

Loman, J. C. C.—Freies Jod als Drüsensecret. (Tijdschr. Neder. Dierk. Ver. Deel 1, 1887, pp. 106–108.)

Riley, Charles Valentine.—Proc. Ent Soc. Washington, March 13, 1888. i, pp. 87–89.

——— Notes on the eversible glands of larvæ of *Orgyia* and *Parorgyia leucophæa* and *P. clintonii* (*achatina*). (See 5th Rep. U. S. Ent. Comm. p. 137.)

Denham, Ch. S.—The acid secretion of *Notodonta concinna*. (Insect Life, i, p. 147, 1888. Hydrochloric acid).

Michin, Edward A.—Note on a new organ, and on the structure of the hypodermis, in *Periplaneta orientalis*. (Quart. Journ. Micros. Sc. Dec. 1888, xxiv, 1 Pl.)

——— Further observations on the dorsal gland in the abdomen of *Periplaneta* and its allies. (Zool. Anz. 27 Jan. 1890, pp. 41–44.)

Maynard, C. L.—The defensive glands of a species of Phasma, *Anisomorpha buprestoides*. (Contributions to Science, i, April, 1889.)

Schaeffer, Cæsar.—Beitrage zur Histologie der Insekten. (Zool. Jahrb. Morph. Abth. iii, pp. 611–c52, T. 29, 30, 1889. Treats of the ventral glands in prothorax of caterpillars. Scales and hairs are secretions from the very greatly enlarged hypodermic cells).

Gilson, G.—Les glandes odorifères der *Blaps mortisaga* et de quelques autres espèces. (La Cellule, v, 1–21, Pl., 1889.)

——— The odoriferous apparatus of *Blaps mortisaga*. (Rep. 58th Meeting Brit. Assoc. Adv. Sc. 1889, pp. 727–728.)

Haase, Erich.—Ueber die Stinkdrüsen der Orthoptera. (Sitzgsber. Ges. Naturf. Freunde, Berlin, pp. 57–58, 1889.

——— Zur Anatomie der Blattiden. Zool. Anz. xii, Jahrg. pp. 169–172, 1889.)

Herbst, Curt.—Anatomische Untersuchungen an *Scutigera coleoptrata*. (Ein Beitrag zur vergleichenden Anatomie der Articulaten. Dissert. Jena, pp. 36 (Hautdrüsen, Coxal—Organ.), p. 1, 1889.)

Wheeler, William M.—Hydrocyanic acid secreted by *Polydesmus virginiensis* Drury. (Psyche, v, p. 422.)

——— New glands in the hemipterous embryo. (Amer. Nat. Feb. 1890, p. 187. Odorous (?) glands).

Jackson, W. Hatchett.—Studies in the morphology of the Lepidopera. Pt. i. (Trans. Linn. Soc. London, 2 ser. zoöl. v, May, 1890.)

Krauss, Hermann.—Die Duftdrüse der *Aphlebia bivittata* Brullé (Blattidae) von Teneriffa. (Zool. Anz. xiii, Jahrg. 1890, pp. 584–587, 3 figs.)

Fernald, H. T.—Rectal glands in Coleoptera. (Amer. Nat. xxiv, p. 100–101, Pl. 4, 5, 1890.)

Vosseler, Julius.—Die Stinkdrüsen der Forficuliden. (Arch. Mikr. Anat. xxxvi, 1890, pp. 565–578, Taf. 29.)

Carlet, G.—Sur les organes sécréteurs et la sécrétion de la cire chez l'Abeille. (Comptes Rendus, Tome 110. pp. 361–363, 1890).

Carrière, J.—Die Drüsen am ersten Hinterleibsringe der Insektenembryonen. (Biol. Centralblatt, xi, pp. 110–127, 1891.)

Borgert, Henry.—Die Hautdrüsen der Tracheaten. (Inaugural Diss. Jena, 1891, pp. 1–80.)

Lang, Arnold.—Lehrbuch der Vergleichende Anatomie, English Trans. by Henry M. and Matilda Bernard, 1891, pp. 458–459.

Kennel, J. von.—Die Verwandtschaftverhältnisse der Arthropoden (Schriften herausgegeben von der Naturforscher Gesellschaft bei der Universität Dorpat, vi. Dorpat, 1891).

Patton, W. H.—Scent-glands in the larva of Limacodes. (Can. Ent. xxiii, Feb. 1891, p. 42–43. 8 pairs of glands with pores along the edges of the back.)

Batelli, Andrea.—Di una particolarita nell integumento dell' *Aphrophora spumaria.* Monitore Zoöl. Ital. Anno 2, p. 30–32, 1891. (Dermal glands in the hindermost segment.)

Ash, C. D.—Notes on the larva of *Danima banksii* Lewin. (Ent. Month. Mag. Sept. 1892, p. 232. (Fig.) Notodontian larva protrudes from under side of prothoracic segment a y-shaped red organ like that of Papilio. No odor or fluid given out.

Bernard, Henry M.—An endeavor to show that the tracheæ of the Arthropoda arose from setiparous sacs. (Spengel's Zool. Jahrbuch, 1892.)

Latter, Oswald.—The secretion of potassium hydroxide by *Dicranura vinula*, and the emergence of the imago from the cocoon. (Trans. Ent. Soc. London, 1892. 287, also xxxii. Prof. Meldola added that the larva of *D. vinula* secretes strong formic acid, and is the only animal known to secrete a strong caustic alkali.)

——— Further notes on the secretion of potassium hydroxide by *Dicranura vinula* (imago) and similar phenomena in other Lepidoptera. (Trans. Ent. Soc. London. Nature, 1895, p. 551. March 20, 1895.)

Zograff, Nicolas.—Note sur l'origine et les parentes des Arthropodes, principalement des Arthropodes trachéates. (Cóngrès Internationale de Zoologie 2me Session á Moscow, Aug. 1892. Part 1. Moscow, 1892, pp. 278–302, 1892. Cyanogenic glands in Myriopods, p. 287.)

Swale, H.—Odour of *Olophrum piceum.* (Ent. Month. Mag. v, Jan., 1896, p. 1–2.)

Cuénot, L.—The ejection of blood as a means of defence by some Coleoptera. (Comptes Rendus, Acad. Sc. France, April 16, Nature, April 26, 1894.)

Holmgren, Emil.—Studier öfverhudens och de körtelartade hudorganens morfologi hos skandinaviska macrolepidopterlarver, 9 Taf. (K. Svenska Vetenskaps-Akademiens Handlingar, Bd. xxvii, No. 4, Stockholm, 4°, 1895, pp. 82.)

PRELIMINARY HANDBOOK OF THE COLEOPTERA OF NORTHEASTERN AMERICA.

By H. F. Wickham.

(Continued from Vol. III, p. 190.)

Amara *Bon.*

This genus includes those Pterostichini in which the terminal joint of the palpi is not dilated, the labial with the penultimate joint plurisetose in front and longer than the last one. The elytra are without the dorsal puncture. The genus is of great size and offers considerable diversity of form, some of the species resembling *Pterostichus* or *Harpalus*, while the majority have a facies which is unmistakeable. The form of the thorax has served a good purpose in the primary separation into groups, after which secondary sexual characters must be largely relied upon. By the kind permission of Dr. Horn, his synopses and descriptions have been used in this paper (almost without change except in the way of condensation) for those portions of the genus on which he has written. The first part, the subgenus *Lirus*, has been largely taken from the descriptions of Dr. LeConte, who, however, had not tabulated the species. No attempt has been made to disturb the existing status of species, the idea being simply to give a clue to the identification as they now rest. A careful revision of the forms with subcordiform thorax is a desideratum but must be left to those who have access to types.

Synopsis of Species.

1. Thorax broader in front of the base, narrowed posteriorly and usually more or less cordiform 2
Thorax narrowed anteriorly, broad towards the base or sometimes slightly narrowed in that part 14
2. Posterior tibiæ not pilose internally in either sex 3
Posterior tibiæ of male densely pilose internally 11
3. Middle tibiæ simple in both sexes 4
Middle tibiæ of male bidentate internally 6
4. Hind angles of prothorax not carinate 5
Hind angles of thorax with distinct carina .... **similis.**

5. Larger (8–10 mm.), elytral striæ distinctly punctured, prothorax punctured from side to side at base .... **avida.**
Smaller (6 mm.), elytral striæ nearly smooth, thorax not punctured at base. **arenaria.**

6. Thorax sinuate on the sides near base, hind angles rectangular or prominent..7
Thorax not sinuate on sides near base, hind angles obtuse..................9

7. Elytra more parallel, more than three times as long as the prothorax. **rufimanus.**
Elytra more rounded on sides, less shining, less than three times as long as prothorax 8

8. Sides of prothorax more rounded, more suddenly sinuate at base, hind angles rectangular, prominent .... **laticollis.**
Sides of prothorax less rounded, less suddenly sinuate at base, hind angles rectangular, not prominent .... **carinata.**

9. Thorax nearly quadrate, elytral striæ fine, finely punctate anteriorly..**elongata.**
Thorax broader than long, elytral striation less fine, punctuation quite evident.10

10. Blackish piceous, elytral striæ more finely punctate ....**hyperborea.**
Blackish, elytra brown, striæ more strongly punctate ....**brunnipennis.**

11. Prosternum with side pieces smooth 12
Prosternum with side pieces punctured, scutellar stria long ....**apricaria.**

12. Prosternum ♂ not punctured..........................**septentrionalis.**
Prosternum ♂ with oval punctured space..............................13

13. Scutellar stria short or wanting, meso- and metasternal side-pieces punctured. **exarata.**
Scutellar stria long, meso- and metasternal side-pieces smooth ....**latior.**

14. Posterior tibiæ of ♂ densely pilose internally 15
Posterior tibiæ of ♂ not or scarcely pilose internally 23

15. Spur of anterior tibia trifid 16
Spur of anterior tibia simple..17

16. Hind angles of thorax obtuse, four antennal joints largely pale....**angustata.**
Hind angles of thorax sharp, rectangular, only three basal antennal joints pale........... .... **pallipes.**

17. Antennæ not carinate, prosternum of ♂ not punctured.....................18

Basal impressions of thorax distinct.......... .... **polita.**

23. Antennæ and legs piceous black...24

Antennæ pale, legs usually so................... 25

24. Elytra with silken lustre, intervals with more or less uneven surface, color variable..**interstitialis.**

Elytra shining, intervals flat, even, smooth.....................**erratica.**

25. Prosternum plurisetose at tip; metepisternum longer than wide at base..**obesa.**

Prosternum bisetose at tip, sides of thorax distinctly deplanate, legs rufo-testaceous; ♂ shining, ♀ opaque....... ....**remotestriata.**

Prosternum without setæ, sides of prothorax not deplanate...............26

26. Prosternum of ♂ with a small group of punctures.......................27

Prosternum of ♂ smooth as in ♀......................................28

27. Form rather broadly oval, not twice as long as broad, legs rufo-testaceous. **chalcea.**

Form oblong, twice as long as broad, thorax very broad, legs rufo-testaceous. **gibba.**

28. Sides of thorax oblique behind, apex of scutellar stria united to first..**harpalina.**

Sides of thorax not oblique behind the middle, scutellar stria free at apex....29

29. Thorax distinctly emarginate at apex, front angles sharply prominent. **subænea.**

Thorax nearly truncate at apex, anterior angles very obtuse...... 30

30. Sides of metasternum and met-episterna coarsely punctate...........**rubrica.**

Sides of metasternum and met-episterna smooth................**musculus.**

It will be noted that two species belonging to the sixth division (*Lirus* Zimm.), are omitted from the table, namely *L. fulvipes* Putz. and *L. canadensis* Putz., no specimens being at hand for comparison. The descriptions are intercalated in the proper place.

A. **avida** *Say.*—Black or piceous, broad, oblong, thorax wide, narrowed posteriorly, hind angles nearly rectangular, base with numerous coarse punctures extending entirely across, basal foveæ ill defined though moderately deep. Elytral striæ deep, distinctly punctured. Antennæ and legs rufous. Length 8–9.5 mm., = .32–.38 in.

Habitat: NewYork, New Jersey, Massachusetts, Illinois, Indiana, Iowa.

A. **arenaria** *Lec.*—Much smaller that the preceding, piceous black, tip of abdomen reddish, legs, antennæ and palpi rufous or rufo-testaceous. Thorax with sides rounded, narrowed at base, median longitudinal line deep; the base is not punctured or only extremely finely so, and the basal foveæ are smooth. Elytra shining, striæ moderatety deep and scarcely visibly punctate. Length 6 mm. = .24 in.

Habitat: New York (Buffalo), Mt. Washington, New Hampshire.

A. **similis** *Kirby.*—Black or nearly so, shining, prothorax subquadrate, narrower at base, sides rounded, margin reflexed, of uniform width, hind angles carinated, obtuse, basal impressions deep, punctured. Elytra rather finely striate, punctures small but distinct. Legs rather dark rufous, antennæ rufo-piceous, stout. Length 11–12 mm. = .44–.48 in.

Habitat: Canada, Northwest Territory, New Hampshire (Mt. Washington).

A. rufimanus *Kirby.*—Blackish, with very distinct greenish tinge, shining, form elongate. Thorax short, moderately narrowed posteriorly, sides rounded and with a sharp sinuation near the hind angles which are rectangular and prominent; basal impressions deep, punctured and with an acute carina on outer margin. Elytra very long, sides parallel, striæ well marked and distinctly punctured except toward the tip. Legs and antennæ rufous. Length 11.5–12 mm. = 46–.48 in.

Habitat: Canada, Wisconsin, Wyoming, Colorado, Magdalen Island.

The above description is made out from a pair named *lacustris* Lec., in my collection. The name is considered a synonym of *rufimanus* Kirby, though there is little of value in the last description.

A. laticollis *Lec.*—Broader and more oblong, piceous black, less shining, thorax larger in proportion to the elytra which are more rounded on the sides. Sides of thorax much rounded, sinuate near base, hind angles hardly as prominent as in *rufimanus*, basal foveæ deep, the carina well marked and acute. Elytral striæ with very distinct punctures except towards the tip. Antennæ, legs and epipleuræ rufous. Length 11–14 mm. = .44–.56 in.

Habitat: Kansas, Nebraska, Colorado, Wyoming, Illinois, Misthorax narrower behind, sides rounded, oblique near the base and not sinuate. Hind angles obtuse, basal foveæ bistriate, basal region punctate, carina present but rather blunt. Elytra oblong ovate, striæ punctured, less distinctly so at apex. Legs reddish. Length 9–11 mm. = .36–.44 in.

Habitat: Labrador, White Mountains, New Hampshire.

A. **brunnipennis** *Dej.*—Oblong, head and thorax blackish-æneous, thorax with sides rounded, punctured behind, basal foveæ bistriate. Elytra brownish or obscure reddish, oblong, subparallel, striate-punctate, suture and margins blackish. Antennæ and base of tibiæ rufous, femora and tarsi rufo-piceous. Length 8.5 mm. = .34 in.

Habitat: Labrador, White Mountains, New Hampshire.

A. **canadensis** *Putz.*—Piceous, elytra submetallic, palpi testaceous, antennæ and legs brownish. Prothorax transverse, sides angulate, slightly rounded, hind angles rectangular, basal margin bisinuate, base punctulate, basal foveæ two, oblong, impressed. Elytra convex oblong-ovate, humeri somewhat rounded, striæ punctate. Episterna and sides of abdomen punctured. Length 11 mm. = .44 in.

Habitat: Northern Canada.

This species is unknown to me, the above description being translated from Putzeys. It probably will be easily recognized by the shape of the prothorax.

A. **fulvipes** *Putz.*—Black, shining, palpi, antennæ and legs rufous. Prothorax with the sides rounded, not sinuate, narrowed anteriorly and posteriorly. Anterior angles somewhat prominent, but rounded, hind angles acute, slightly prominent. Elytra oblong-ovate, narrowed behind, humeri obtusely angulate. Length 10 mm. = .40 in.

Habitat: Missouri (Putzeys), Allegheny, Pennsylvania (Hamilton.)

The description is translated from Putzeys. The Pennsylvania specimens sent as this species have the thoraxic margin somewhat sinuate near the base, which is coarsely punctured (to a varying degree of density) in the region of the foveæ, which are only moderately distinct. The female is broader and less shining than the male, and the sides of the thorax are more rounded.

A. **apricaria** *Payk.*—Oblong oval, piceous, surface feebly bronzed. Head smooth, frontal impressions moderate, antennæ pale rufous. Thorax one-half broader than long, sides moderately arcuate in front, slightly sinuous and feebly narrowed toward the base, hind angles rectangular, slightly prominent. Basal foveæ deep, the inner one rounded, carina obtuse, one-fourth the length of the thorax; basal third of thorax punctured, punctures coarse, sparser in the middle. Elytra oval, moderately deeply striate (less so at apex), striæ crenate-punctate. Scutellar stria long, thoracic side pieces coarsely punctured, abdomen moderately coarsely punctured at sides. Length 8 mm. = .32 in. The description is taken from Dr. Horn's account of *Putzeysii*, which, he writes, is a synonym of the above.

Habitat: Newfoundland, Massachusetts, Europe.

A. **septentrionalis** *Lec.*—Elongate, oblong oval, blackish-piceous, more or less æneous above, thorax one-half broader than long, narrowed in front and behind, sides broadly rounded, base sparsely punctate, foveæ deep, double, hind angles sub-obtuse. Elytra striate, stria finely punctured, smooth at tip. Antennæ rufous, legs rufo-piceous. Prosternum with a broad feeble longitudinal channel, less evident in the female. Length 7.5 mm. = 30 in.

Habitat: Lake Superior, New York.

A. **exarata** *Dej.*—Convex, form sub-ovate, color blackish-piceous. Thorax sub-quadrate, somewhat narrowed behind, basal foveæ double, punctured. Elytra with deep-punctured striæ. Antennæ and legs rufous. Length 8–9 mm. = .32–.36 in.

Habitat: Northeast America in general.

A. **latior** *Kirby.*—Piceous, more or less bronzed. Prothorax broader than long, not sinuate at base, sides rounded, hind angles rectangular. Basal foveæ double, punctured, elytra striate, striæ punctured, less distinctly at apex. Length 9–10 mm. = .36–.40 in.

foveæ double, slightly punctured; elytra broader than the thorax, striæ not deeper behind. Legs rufous. Length 7.5 mm. = .30 in.

Habitat: New York, Wisconsin, Canada, New Jersey, Iowa.

A. **crassispina** *Lec.*—Broadly oval, æneous above, body beneath and legs rufo-piceous, thorax twice as broad as long, narrowed anteriorly, sides obliquely rounded, sub-explanate behind, base hardly foveate, elytral striæ impunctate, not deeper behind. Antennæ piceous, the three basal joints testaceous. Length 9 mm. = .35 in.

Habitat: Lake Superior.

A. **cupreolata** *Putz.*—Oblong oval, above bronzed, thorax narrowing from a point in advance of the base. Legs piceo-rufous, hind angles of thorax slightly obtuse.

Habitat: New Jersey, Illinois.

A. **fallax** *Lec.*—Oval, æneous above, thorax nearly twice as broad as long, moderately narrowed anteriorly, sides rounded, anterior angles not prominent, basal foveæ indistinct, elytral striæ not deeper behind or only slightly so. Legs black, tibiæ piceous at base. Length 7.5–9 mm. = .30–.36 in.

Habitat: Lake Superior, New York, Alabama.

A. **protensa** *Putz.*—Oblong oval, scutellar stria without ocellate puncture. Thorax with very faint basal impressions, surface not punctured. Elytral striæ smooth.

Habitat: Illinois (Teste Bolter).

A. **polita** *Lec.*—Oval, shining, more or less cupreous, thorax twice as broad as long, narrowing anteriorly from before the middle, basal foveæ small but deep. Elytral striæ not deeper behind, legs black. Length 6.25 mm. = .25 in.

Habitat: Canada, New York, Nebraska, New Mexico, Idaho.

A. **interstitialis** *Dej.*—Oval, somewhat oblong, moderately convex, color variable from brownish bronze to bright green, cupreous or nearly black. Antennæ usually black, first joint sometimes pale. Thorax less than twice as wide at base as long, hind angles rectangular. Elytra with fine indistinctly punctured striæ, intervals slightly convex usually with undulating surface, the alternate ones often slightly more elevated, surface distinctly alutaceous. Body beneath smooth, and, with the legs, piceous black. Length 6.5–10 mm. = .26–40 in.

Habitat: Nova Scotia to Hudson's Bay, Alaska, Kamtschatka, south to Pennsylvania and northern California. Also found in Europe.

A. **erratica** *Sturm*.—Elongate oval, æneous, cupreous or nearly black, shining. Antennæ piceous black, two basal joints often red. Elytra differing as noted in table. Length 6–7.5 mm. = .24–.30 in.

Habitat: About as in the preceding, not coming farther south than Canada and Vermont.

A. **obesa** *Say*.—Oblong-oval, narrower in front, piceous-black, shining, the elytra opaque in the female. Antennæ ferruginous or brownish. Thorax about one-half broader than long, sides arcuate at apical half, then nearly parallel to base. Hind angles rectangular, disk moderately convex, basal foveæ two, the outer deeper and with an external carina. Basal region punctate, smoother at middle. Elytra striate, striæ finely punctured and more deeply impressed at apex, intervals slightly convex ♂, or flat ♀. Beneath piceous black, legs piceous or rufo-piceous. Length 9–12 mm. = .36–.48 in.

Habitat: New York, District of Columbia, Indiana, Montana, Michigan, Idaho, Hudson Bay, Colorado, Nebraska, Utah, Oregon, Washington.

A. **remotestriata** *Dej*.—Oblong-oval, moderately convex, brownish or very slightly piceous, males shining with faint bronze lustre, females dull. Antennæ always rufo-testaceous. Thorax about one-half broader at base than long, slightly wider at middle than at base, sides arcuate, hind angles sharply rectangular, basal foveæ double, shallow, basal region sparsely, often very feebly, punctate. Elytra finely striate, striæ smooth or very finely and feebly punctate, intervals flat in both sexes. Body beneath smooth, metathorax and abdomen darker, epipleuræ paler. Legs always pale rufo-testacous. Length 6.5–8 mm. = .26–.32 in. *A terrestris* Lec., is synonymous.

Carolina, Georgia, Texas, Michigan, Wisconsin, Nebraska, Colorado.

A. **gibba** *Lec.*—Oblong-oval, distinctly narrower in front, brownish or nearly piceous, shining, a feeble trace of bronze luster, legs always pale. Antennæ pale rufo-testaceous. Thorax one and three-fourth times as wide at base as long, slightly narrowed anteriorly, sides regularly arcuate, base slightly narrowed, hind angles rectangular. Entire basal region usually punctate. Elytra distinctly wider at base than the thorax, sides arcuate, disc moderately deeply striate, striæ finely but distinctly punctate, intervals flat, slightly convex near the base. Body beneath darker, shining. Length 6.5–7.5 mm. = .26–.30 in.

Habitat: Lake Superior region, Colorado, Arizona, South California, New Jersey.

A. **harpalina** *Lec.*—Form oblong, rufo-piceous or testaceous, moderately shining. Legs and antennæ rufo-testaceous. Thorax at middle less than twice as wide as long, slightly narrowed in front, sides arcuate in front, oblique at basal half, hind angles sharply rectangular, basal region vaguely bi-impressed each side, this whole region punctate. Elytral base wider than that of thorax, disk moderately deeply striate, striæ finely crenately punctured, intervals convex. Beneath usually paler than above, sides of metasternum and episterna very coarsely and closely punctate, the sides of first three ventral segments more sparsely so. Length 6.25–7 mm. = .25–.28 in.

Habitat: Utah and New Mexico. Reported from New Jersey under the synonym *acutangula* Putz.

A. **subænea** *Lec.*—Form oblong-oval, narrowed anteriorly, piceous, faintly bronzed, shining. Antennæ rufo-testaceous. Thorax about one half wider at base than long at middle, distinctly narrowed at apex, sides regularly arcuate, front angles prominent, hind angles rectangular. Elytra not wider at base than the thorax, striæ moderately deep, finely crenately punctured, intervals convex. Beneath usually paler than above, sides of metasternum and first two ventral segments with a few coarse punctures. Length 5–7 mm. = .20–.28 in.

Habitat: Lake Superior Region, Nebraska, Colorado.

A. **rubrica** *Hald.*—Oblong, moderately convex, rufo-testaceous to castaneous, shining in both sexes. Antennæ pale. Thorax not twice as wide as long, very little narrowed in front, apex very feebly emarginate, sides regularly arcuate, hind angles usually very obtuse, disc convex, basal impressions very feeble, usually punctured, sometimes quite smooth. Elytra at base very slightly wider than the thorax, striæ moderately deep, finely crenately punctured, intervals convex. Beneath paler, sides of metasternum and the met-epimera with coarse punctures. Ventral segments coarsely sparsely punctate at sides of the first four. Legs pale rufo-testaceous. Length 6–7 mm. = .24–.28 in.

Habitat: Middle States region to Texas and Colorado.

A. musculus *Say.*—Oblong oval, rufo-piceous or piceous, shining, sometimes faintly æneous. Antennæ pale. Thorax rather more than half wider than long, distinctly narrowed anteriorly, sides arcuate, hind angles usually obtuse, sometimes nearly rectangular, basal impressions almost obliterated, surface near hind angles sparsely indistinctly punctured or entirely smooth. Elytra at base not wider than the thorax, striæ moderately deep, finely crenately punctured, intervals slightly convex. Beneath of nearly same color as above, abdomen usually paler, first ventral segment with a few punctures at sides. Legs rufo-testaceous. Length 5–5.5 mm. = .20–.22 in.

Habitat: Pennsylvania, Ohio, Illinois, District of Columbia, North Carolina, Wisconsin, Nebraska, Arizona.

Loxandrus *Lec.*

Differs from *Pterostichus* and allied genera by the anterior tarsi being obliquely dilated in the males. The species included are usually black, shining, iridescent beetles, rarely with any color-markings beyond the tendency to piceous or yellow shades of the appendages. They occur chiefly in the Southern States, and are difficult of separation besides being quite rare in collections. A tabular arrangement of the characters regarded as of specific value by previous writers will allow us ckish-brown, the first joint of the former ferruginous. Elytra with ommon reddish sutural spot near the tip; striæ extremely finely nctured, intervals flattened, the third with one large puncture, ghtly in advance of the middle, near the second stria. Prothorax quadrate. Length 6–7 mm. = .24.28 in.

Habitat: Illinois, Florida, Texas.

L. agilis *Dej.*—Black, shining, iridescent, prothorax subquadrate, rrower anteriorly, the base punctured at middle, hind angles rounded tip. Legs piceous or ferruginous, antennæ ferruginous at base be-ming darker toward the tip. Elytra with strongly punctured striæ. ngth 5–6 mm. = .20–.24 in.

Habitat: District of Columbia, Arkansas, Pennsylvania, south to orida.

L. minor *Chaud.*—Black, shining, thorax moderately rounded at les, base nearly smooth, the hind angles obtuse with the extreme tip unded. Elytral striæ finely punctured, interstices moderately convex. tennæ dark, except the three basal joints which are reddish. Legs ddish or with femora piceous. Length 9–10 mm. = .36–.40 in.

Habitat: Louisiana, District of Columbia, Arkansas, Indiana, Illi-is, Missouri.

L. erraticus *Dej.*—Black, shining, iridescent, prothorax sub-adrate, the hind angles not rounded. Elytra striate, striæ with obso-te punctures. Legs reddish or brownish, femora ordinarily darker. ntennæ dark, first two joints reddish. Length 9.5 mm. = .38 in.

Habitat: Illinois, Florida, Louisiana.

Diplochila *Brullé.*

Flattened insects of rather broad form and smooth surface. The ytra have the eighth and ninth striæ very close together, the third in-rspace has a large puncture near the middle; the elytral margin is not terrupted at posterior third as in the Pterostichini. Supra-orbital tigerous punctures, two. The species are few in number and may be stinguished by these characters:

Synopsis of Species.

orax with hind angles moderately well defined.
eventh stria of elytra feeble, not approaching the sixth in distinctness.
  Smaller (13–15 mm.) .... **laticollis.**
  Larger (18–20 mm.) .... var. **major.**
venth stria of the elytra about as distinct as the sixth. Thorax less narrowed
  in front, more so at base.. **impressicollis.**
ax with hind angles obtusely rounded. Smaller, elytral striæ finer, seventh
lmost obliterated.. **obtusa.**

D. laticollis *Lec.*—Black, somewhat shining, thorax transverse, sides slightly rounded and feebly sinuate towards the base, hind angles distinct. Elytra moderately deeply rather finely striate, the striæ with fine punctures, seventh feeble. Length 13–20 mm. = .52–.80 in.

Habitat: New York, New Jersey, Pennsylvania, Indiana, Illinois, Iowa, Canada, Nebraska, Kansas, Michigan, Florida.

D. impressicollis *Dej.*—Usually black, sometimes the alternate elytral interstices are reddish. The thorax differs from that of *laticollis* as stated in the table; and the seventh elytral stria, while sometimes slightly fainter than the sixth, is still distinct. Length 16–17 mm. = .64–.68 in.

Habitat: New York, Canada, Michigan, Indiana, Iowa, Illinois, South Dakota, Utah, Washington, Oregon.

D. obtusa *Lec.*—Black, smaller than the other species and with the outer striæ of the elytra very weak, the sixth being often quite feeble, while the seventh may be almost obliterated. The thorax has rounded hind angles and very deep well-defined basal foveæ. Length 11–12 mm. = .44–.48 in.

Habitat: Illinois, Indiana, Iowa, Kansas, Nebraska, Nevada.

Dicælus *Bon.*

Usually large species of black, purplish or metallic color, the thorax broad, the elytra usually deeply striate, the seventh interval carinate from the humerus to a varying distance. With the exception of *lævipennis*, which extends into western Arizona, they are confined to the region east of the Rocky Mountains and to Mexico, being more numerous in the Atlantic States, especially those to the south.

margin...**ovalis.**
Form elongate, thorax with two setigerous punctures near middle of margin.....................................**elongatus.**
Larger species (20–25 mm.).
Form elongate, sides of thorax reflexed posteriorly......**ambiguus.**
Form broad, sides of thorax not or but slightly reflexed posteriorly, elytral intervals rather narrow, convex............. **dilatatus.**
Thorax narrowed at base, elytra feebly shining........................**teter.**
Thorax about equally narrowed at base and apex, humeral carina short, elytra very shining................ .... **politus.**

Most of the above characters have already been used in the synoptic table of *Dicælus* published some time ago by Dr. Horn in the Brooklyn Bulletin. The arrangement has been changed to suit the different conditions consequent upon the more restricted fauna under consideration. The setigerous punctures referred to under *ovalis* and *elongatus* are actually anterior to the middle, but the above wording has been adopted to keep students from misconstruing the punctures meant. There is usually a sub-basal puncture to be seen and often a sub-apical bristle as well.

D. sculptilis *Say*.—Black, shining, but without metallic luster. Easily known from the other species of the genus by the peculiar roughness of the elytra, the alternate intervals being curiously broken and distorted. The bottoms of the striæ are granulate or marked with ocellate punctures. Length 16–20 mm. = .64–.80 in.

Habitat: Ohio, Pennsylvania, Wisconsin, Iowa, Illinois, South Dakota, Kansas, District of Columbia, Maryland, Manitoba.

D. splendidus *Say*.—Blackish with violaceous or purplish reflections, especially on margins of pronotum and on lower surface of body. Upper surface of prothorax marked with fine wavy lines, mostly transverse in direction, median longitudinal line very clear and sharp-cut. Elytra coppery or brassy, shining, striæ deep, intervals convex. Length 18–25 mm. = .76–1.00 in.

Habitat: Nebraska, Kansas, Iowa, Illinois, Missouri, Louisiana.

D. purpuratus *Say*.—Very closely resembling *splendidus*, but differing in being of a purplish or violaceous color, without brassy elytra, the antennæ and legs black. The form is more elongate than in *splendidus*, and the head larger in proportion. Length 20–25 mm. = .80–1.00 in.

Habitat: New York, Massachusetts, Pennsylvania, Indiana, Louisiana, Florida, Missouri, Illinois, Iowa.

D. furvus *Dej.*—Form short, broad, color blackish-opaque, or slightly shining. The median thoracic line is feeble, the lateral margins slightly reflexed. Elytral intervals alternating, striæ smooth. The interval between the sixth and seventh stria bears several punctures near the base. Length 15 mm. = .60 in.

Habitat: Ohio, Kentucky, Missouri, Florida.

D. crenatus *Lec.*—The district punctuation of the elytral striæ will serve to separate this species from its neighbors. I have seen no specimens and am unable to give other differential characters. Length 15–16 mm. = .60–.64 in.

Habitat: Louisiana, Texas; recorded also from Buffalo, New York.

D. ovalis *Lec.*—Black, form short, the median thoracic line very distinct and deeper near base and apex. Elytral striæ deep, smooth, intervals not alternating, humeral carina long. Length 15–16 mm. = .60–.64 in.

Habitat: New York, New Jersey, Pennsylvania, Illinois, Maryland, District of Columbia, Ohio, Texas.

D. elongatus *Bon.*—Form more elongate than in the preceding species, thorax with deep and distinct longitudinal median line, two deep setigerous punctures anterior to the middle of the prothorax. Elytra with deep regular striæ, intervals convex, not alternating. Length 15–18 mm. = .60–.76 in.

Habitat: New York, New Jersey, Pennsylvania, Illinois, Indiana, Ohio, Maryland, District of Columbia, Texas, Iowa, Louisiana, Mississippi.

D. **teter** *Bon.*—Black, slightly shining, thorax broader in front of middle and considerably narrowed behind, longitudinal median line very deep. Elytra deeply striate, striæ smooth, intervals regular, very convex. The form of thorax gives somewhat the appearance of certain Pterostichi. Length 20–22 mm. = .80–.88 in.

Habitat: New York, Pennsylvania, Ohio, Maryland, New Jersey, District of Columbia, Virginia.

D. **politus** *Dej.*—Smaller, black, very shining, form resembling that of *teter*, but the thorax is more nearly quadrate, being less narrowed behind. The elytra are regularly, smoothly and deeply striate, the humeral carina short and obtuse. Length 12–15 mm. = .48–.60 in.

Habitat: New York, New Jersey, Pennsylvania, District of Columbia, Florida.

Licinus *Latr.*

Antennæ with thre ebasal joints glabrous, eighth and ninth striæ of elytra distinct; elytra strongly sinuate at apex, seventh interval not carinate.

L. **silphoides** *Fabr.*—Black, somewhat shining, thorax rounded, punctate. Elytra with three rather faint costæ, punctato-striate, interspaces deeply and closely punctured. Length 14–15 mm. = .56–.60 in.

Habitat: Massachusetts. Not a true member of our fauna, being a European species.

Badister *Clairv.*

Small beetles of a form suggesting our common species of *Agonoderus*. They differ from the three preceeding genera in having only two basal joints of the antennæ entirely glabrous. The eighth and ninth elytral striæ are not approximated, the third interval has two dorsal punctures. A condensation of Dr. Leconte's table will suffice to separate the species of northeastern America as follows:

Synopsis of Species.

Elytral striæ deep, interspaces narrow, convex. Elytra rufo-piceous, darker behind, antennæ and legs reddish....... .... **notatus.**

Elytral striæ fine, interspaces flat.

- Elytra spotted.
  - Prothorax, legs and elytra bright yellow, the latter with broad median band interrupted at suture and an apical blotch iridescent black..... **pulchellus.**
  - Prothorax black, legs and elytra orange, the latter with broad median band and apical spot black, confluent longitudinally from 4th to 6th stria. **maculatus.**
- Elytra not spotted, sometimes bicolored.

Prothorax and legs testaceous, elytra piceous, margined at base, sides and suture with testaceous, epipleuræ testaceous. Hind angles of prothorax broadly rounded .... **obtusus.**

Piceous, head as broad as the prothorax, hind angles of latter obtuse and slightly rounded .... **ferrugineus.**

Black or nearly so, legs yellow.

  Hind angles of prothorax very much rounded .... **flavipes.**

  Hind angles of prothorax not or feebly rounded, margin piceous.

    Side margin of prothorax narrow, not more reflexed towards base. **micans.**

    Side margin broader, more reflexed near base .... **reflexus.**

B. notatus *Hald.*—The characters given above will amply distinguish this species, as it is the only one in our fauna with deep elytral striæ and narrow convex interspaces. Length 4.5 mm. = .18 in.

Habitat: Canada, New York, New Jersey, Illinois, Louisiana, Iowa.

B. pulchellus *Lec.*—Above bright yellow, head black, elytra with a very large submedian spot on each, reaching nearly to the suture and each with an apical spot, black. The two spots on each elytron may be connected by a broad longitudinal stripe or may be quite separate. Beneath mostly black, the legs and prothorax yellow. Antennæ dusky, first joint yellow. Length 5.5–6.5 mm. = .22–.26 in.

Habitat: New York, Indiana, Illinois, Iowa, Wisconsin, Canada, Georgia, Florida.

B. maculatus *Lec.*—Black, thorax with deep transverse impression, elytra orange-yellow with black markings as given in the table. Legs yellow, antennæ dusky, first joint testaceous. Length 6 mm. = .24 in.

Habitat: Pennsylvania.

Habitat: California and Alaska—said to be found at Buffalo, N. Y.

B. flavipes *Lec.*—Black, thorax somewhat narrowed behind, hind angles very much rounded, longitudinal line deep, basal impressions small but deep. Elytra more deeply striate than usual in this group, the interstices more convex; in color they are blackish with a bluish-metallic luster; legs yellowish testaceous, antennæ fuscous. Length 6 mm. = .24 in.

Habitat: New York, Pennsylvania, Louisiana, Florida.

B. micans *Lec.*—Differs from the preceding in the form of the hind angles of the prothorax (as stated in the table) and in the fact that the luster of the elytra is simply blue, not metallic. The striæ of the elytra are less deep and the interstices less convex. Length 5–6 mm.

Habitat: Massachusetts, New York, New Jersey, Illinois, Georgia, Florida.

B. reflexus *Lec.*—Smaller than *micans*, piceous, shining, margin of prothorax and elytra testaceous, the latter with faint metallic reflections. Prothorax trapezoidal, narrowed behind and with the sides more strongly margined than usual, the margin broader and more strongly reflexed near the base; hind angles very obtuse. Legs yellowish, antennæ piceous, tip of last joint pale. Length 4 mm. = .16 in.

Habitat: New York, Michigan, Lousiana, Pennsylvania.

(*To be continued.*)

◆

ILLUSTRATIONS OF NORTH AMERICAN TETTIGINÆ.

By A. P. MORSE, Wellesley, Mass.

(See articles in this Journal, March and September, 1895.)

EXPLANATION OF PLATE.

Figs.	1, 1*a*, lb.	*Nomotettix parvus* ♂.
"	2, 2*a*, 2b.	" *cristatus* ♂.
"	3, 3*a*, 3b.	" *compressus* ♂.
"	4, ♀; 4*a*, ♂.	*Tettigidea prorsa.*
"	5, ♀; 5*a*, ♂.	" *parvipennis.*
"	6, ♀; 6*a*, ♂.	" *lateralis* (?), from Indiana.
"	7, ♀.	" *acuta.*
"	8, ♀; 8*a*, ♂.	" *apiculata.*
"	9, ♀; 9*a*, ♂.	" *spicata.*
"	10, ♀; 10*a*, ♂.	" *armata.*

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

Meeting of June 18th, 1895.

Held at the American Museum of Natural History. President Rev. J. L. Zabriskie in the chair. Twelve members present.

Mr. Beutenmuller proposed for active membership Dr. G. Langmann and Mr. David H. Ray, and for corresponding membership Mr. F. H. Johnson.

An invitation to join the Philadelphia, Newark and Brooklyn Entomological Societies in a field meeting at Jamesburg, New Jersey, on July 4th, was received and accepted with thanks.

Mr. Beutenmuller read a paper "On Collecting at Watchogue Staten Island," communicated by Mr. Wm. T. Davis.

Mr. Johnson exhibited a piece of stone which he found over an ant nest and which had been bored through by the ants, who used the hole as one of the entrances to their nest.

Mr. Fayen exhibited a gooseberry leaf, with the stalk partly eaten through by *Gymnetron teter*, a weevil, living in the seed pods of the Mullein.

"A Copy of Comstock's Manual to the Study of Insects," was exhibited and recommended to the members of the society.

Mr. Zabriskie spoke on species of *Coleophora* living on Juncus, which he said appeared in salt meadows near the sea shore of Long Island. Adjournment.

Meeting of September 17th, 1895.

JOURNAL

OF THE

New York Entomological Society.

Vol. IV. JUNE, 1896. No. 2.

NEW SPECIES OF HETEROCERA.

By William Schaus.

Perophora funebris, sp. nov.

♂. Wings and abdomen dull brownish black with the basal and outer lines almost imperceptible, the latter starting from the costal margin at two-thirds from the base, convexly oblique to vein 7 and then straight to the middle of inner margin. Underneath, this line is wavy and closer to the outer margin. The ♀ is dark brown with the markings as in the ♂ and an oval spot in the cell. Expanse ♂ 45 mm. ♀ 62 mm.

Habitat: Castro, Parana.

Perophora nigrescens, sp. nov.

Wings pale gray, shaded with brown on the extreme outer margins and finely speckled with black, especially on the median space of the primaries. The primaries with a broad black shade at a third from the base and an outer black band angled at vein 7; at the end of the cell a small diaphanous spot. The secondaries with a median black line. Underneath darker, with only an outer line which is curved on both wings. Body light gray speckled with black. Expanse 42 mm.

Habitat: Castro, Parana.

Perophora musa, sp. nov.

Body dark gray, the abdomen dorsally shaded with red. Wings above gray, finely and thinly speckled with black; an indistinct median darker shade minutely speckled with red; at the end of the cell a transparent spot; the costal margin narrowly red; the outer line, fine, dark brown, starting obliquely from the costal margin at four-fifths from the base, forming an angle between veins 7 and 8, and then slightly wavy to the middle of the inner margin of the secondaries. Beyond the line the wings are slightly darker and shaded with red on the inner margins and at the angle on the primaries. Underneath the primaries are darker and the veins on both wings are shaded with red. Expanse ♂ 43 mm. ♀ 51 mm.

Habitat: Castro, Parana.

This species is allied to *P. despecta* Walk.

Perophora pulverula, sp. nov.

Wings above gray finely and thinly speckled with black, a wavy basal brown line, and an outer very dentate brown line; at the end of the cell two contiguous diaphanous spots circled by a fine brown line; fringe brown. Underneath paler with no basal line, and the outer line is closer to the margin and more lunular than dentate. Expanse ♀ 50 mm.

Habitat: São Paulo, S. E. Brazil.

Perophora grisea, sp. nov.

Body and wings above pale brownish gray, thinly speckled with black; a minute transparent spot at the end of the cell on the primaries; the outer line lunular, fine, dark gray, followed by a brownish shade which widens towards the anal angle of the secondaries and is outwardly margined with a blackish line forming long projections between the veins. Underneath pale brownish gray with an outer and a submarginal dentate blackish line. Expanse ♂ 45 mm.

Habitat: São Paulo, S. E. Brazil.

Perophora deprava, sp. nov.

Primaries acute, the outer margin convex opposite vein 3. Wings above light gray minutely speckled with black; an indistinct gray transverse line at a third from the base on the primaries; a black spot at the end of the cell; the outer line dark, forming a black spot on the costal margin, then concave to vein 7 where it is rounded, and then wavy to the inner margin; the fringe brownish gray. Underneath the wings are darker with the outer line finely dentate. Expanse ♂ 35 mm.

Habitat: São Paulo, S. E. Brazil.

Perophora olivia, sp. nov.

Thorax pinkish brown. Abdomen olive brown with darker scales on the anal segment. The basal three-fourths of the wings olive brown, with a large round yellow spot in the cell on the primaries. Two nearly contiguous straight black lines, separated by a fine pinkish brown shade from the anal angle on the secondaries, to vein 8 on the primaries, where the inner line forms an indistinct angle to the costal margin, and the outer line follows vein 8 to the outer margin, above which the costal margin and apex are dark brownish. The outer margins broadly pink shaded with olivaceous on the extreme margin. Underneath the same but paler. Expanse 42 mm.

Habitat: Columbia.

Colabata dora, sp. nov.

Thorax grayish; abdomen yellowish brown irrorated with darker scales. Primaries grayish thickly mottled with darker scales; the outer margin broadly yellowish, a very indistinct wavy basal line, a small yellowish spot containing a brown point in the cell; an irregular outer wavy shade separating the darker portion of the wing from the yellowish outer margin; a terminal lunular brown line; the base and extremity of the fringe brownish. Secondaries light brown, somewhat yellowish on the outer margin; a fine median transverse line and a broad submarginal brown shade. Underneath cream color with two median transverse brown lines and a terminal lunular line on the primaries. Expanse 50 mm.

Habitat: São Paulo, S. E. Brazil.

Closely allied to *C. marginalis* Walk. (*lineosa* Wlk.), but darker and with the markings less distinct.

Apatelodes velutina, sp. nov.

Head and patagiæ violaceous gray, center of thorax very dark brown; abdomen brown with grayish scales on the posterior portion of each segment. Primaries with the basal portion light brown limited by a dark line, heaviest on the costal margin, slightly oblique to below vein 2, and then turning in to the inner margin, preceded on the inner margin near the base by a dark brown shade; the median space velvety gray limited by a dark wavy outer line and containing an indistinct pale streak at the end of the cell; the outer margin gray mottled with reddish brown; a dark velvety brown spot on the costal margin near the apex, followed by two small transparent white spots. Secondaries reddish brown, much darker at the anal angle, above which is the commencement of a transverse line. Underneath the wings are dull reddish brown with a transverse whitish line crossing both wings. Expanse ♀ 38 mm.

Habitat: São Paulo, S. E. Brazil.

Apatelodes corema, sp. nov.

Body light brown with some gray scales on the patagiæ. Primaries light creamy brown; some grayish scales along the costal margin; a basal, indistinct, wavy gray line, followed on the inner margin by a large patch of gray scales; the outer transverse line deeply wavy, outwardly shaded with pale scales and followed by two transparent spots between veins 4 and 5 and 5 and 6. Secondaries light reddish brown. Underneath light reddish brown; an indistinct median transverse shade and an outer line, fine and straight on the primaries, but forming a series of black points on each vein on the secondaries. Expanse ♀ 43 mm.

Habitat: São Paulo, S. E. Brazil.

Apatelodes sericea, sp. nov.

Head dark brown. Thorax pale fawn color, the posterior portion dark velvety brown preceded by a fine transverse line. Abdomen brown, very dark dorsally at the base. Primaries above pale fawn color; a fine oblique line near the base from the costa to the submedian vein, below which is a broad dark shade resting on the inner margin and outwardly bordered by a fine grayish line; a wavy, narrow median transverse shade; the outer line very fine and wavy with a dark point on each vein; some brownish submarginal shades near the apex and a small transparent spot. Secondaries brown, very dark on the inner margin; an indistinct transverse pale line. Underneath fawn color shaded with brown at the apex of the primaries; on the secondaries a median brown spot and an outer grayish line; some submarginal brown shades. Expanse ♂ 45 mm. ♀ 65 mm.

Habitat: São Paulo, S. E. Brazil.

Thelosia, gen. nov.

Antennæ pectinated in the ♂, pubescent in the ♀. Legs slightly hairy. Primaries with the costal margin slightly sinuate, acute at the apex, and the outer margin very convex at vein 5. Veins 6–10-stalked. Secondaries rounded in the ♂, somewhat oblong in the ♀; the costal margin nearly straight; neuration as in *Colabata* Walk. — *Dorisia* Mösch.

Thelosia phalæna, sp. nov.

♂. dark reddish brown above without markings. Underneath duller brown with the costal margins of the primaries and secondaries entirely and thickly speckled with chrome yellow scales; a black point in the cells and an outer transverse brown line.

♀. Thorax violaceous gray. Abdomen reddish brown. Primaries above olive brown with two darker transverse lines, the inner one faintly curved, the outer one straight and parallel with the outer margin; the base of the wings and the outer portion of the transverse lines heavily shaded with lilacine scales; a cluster of similar scales in the cell. Secondaries light reddish brown with an indistinct spot in the cell and an outer transverse darker line. Underneath yellowish brown; a dark transverse streak in the cell and an outer brown line; some lilacine scales at the apex of the primaries. Expanse ♂ 30 mm. ♂ 45 mm.

Habitat: Nova Friburgo, Brazil.

Thelosia camina, sp. nov.

♀. Thorax gray. Abdomen light brown. Primaries fawn color finely speckled with brown; an inner transverse brown line, and an outer similar line, slightly curved from the costa to vein 2, and then straight to the inner margin. Secondaries brownish at the base, fawn color on the outer portion; an indistinct dark median line. Underneath grayish brown with an indistinct transverse line and minute spot in the cell. Expanse 38 mm.

Habitat: Castro, Parana.

Closely allied to *T. phalæna* Schs. but with the outer line always different; in one specimen the median space is heavily shaded with dark brown.

Thelosia truvena, sp. nov.

Secondaries light brown. Underneath primaries gray shaded with brown along the costa, and an indistinct subterminal line; secondaries brownish with a median darker line. Expanse 28 mm.

Habitat: Castro, Parana.

Tarema, gen. nov.

Antennæ pectinated as in *Perophora.* Primaries with the costal and outer margin slightly convex, the inner margin straight; veins 4, 5, 6 starting from discocellular; 7 and 8 stalked from upper angle of cell; a wide space between 8 and 9; Secondaries with the apex very rounded; veins 3 and 4 from lower angle of cell; 5 from middle; 6 and 7 on short stalk from upper angle.

Tarema rivara, sp. nov.

♂. Abdomen reddish brown. Primaries gray along the costa, reddish on the inner margin above the inner angle and at the apex; a whitish transverse outer line at two-thirds from the base, followed from the costa to the middle of the outer margin by a similar line; an oblique dark spot circled with whitish in the cell. Secondaries reddish; a black spot in the cell and a black transverse median line; the costa shaded with gray. Underneath mottled gray and dull red with a double, wavy, submarginal whitish line and the discal spots rather more conspicuous. Expanse 27 mm.

Habitat: São Paulo, S. E. Brazil.

What I believe to be the ♀ of this species has the reddish shades replaced by dark brown.

Sibine extensa, sp. nov.

Head and thorax dark glossy brown nearly black. Abdomen light reddish brown. Primaries reddish brown darkest in the cell; four-fifths of the costa, the median nervure broadly, and the fringe with a silky hue; a single minute white spot beyond the cell. Secondaries light reddish brown with the fringe very dark at the anal angle. Underneath reddish brown. Expanse ♂ 38–46 mm. ♀ 54–64 mm.

Habitat: Jalapa, Mexico.

I have retained for this species a MSS. name given by the late Hy. Edwards.

Sibine plora, sp. nov.

♂. Body dark silky brown, the center of the thorax reddish. Primaries dark silky brown; a streak below the median vein, one through the cell to the apex, and the outer margin dull reddish brown. Secondaries reddish brown, very dark on the inner margin, the veins somewhat paler. The ♀ has a violaceous hue over the silky brown portion of the primaries, and the secondaries are light brown, with dark fringe. Expanse ♂ 34 mm. ♀ 45 mm.

Habitat: Aroa, Venezuela.

This species is allied to *S. modesta* Cr., of which I have a good series from the same locality.

Sibine auromacula, sp. nov.

♂. Body dark silky brown. Primaries silky brown; a large round and a small golden spot below the median vein, and three similar spots beyond the cell, the middle one much the largest and s-shaped. Secondaries with the costal and inner margins broadly dark brown, the rest of the wing white, transparent. Underneath dull brown, except the transparent portion of the secondaries. The ♀ entirely light reddish brown with the golden spots rather larger than in the ♂. Expanse ♂ 31 mm. ♀ 50 mm.

Habitat: Aroa, Venezuela; Pernambuco, Brazil.

Aidos castrensis, sp. nov.

Head and thorax gray. Abdomen brownish. Primaries light gray, the inner margin brownish; two dark indistinct spots near the base; an outer interrupted blackish line, dentate on veins 3, 4 and 5; a terminal row of blackish points; a short upright white line on the inner margin near the angle. Secondaries white faintly tinged with pink on the inner margin; a terminal row of brown spots. Expanse 25 mm.

Habitat: Castro, Parana.

Perola platona, sp. nov.

Dark reddish brown; primaries with some still darker indistinct basal streaks extending to the end of the cell; an indistinct dark shade from the apex to the middle of the inner margin. Expanse 35 mm.

Habitat: Aroa, Venezuela.

Veins 2 and 3 on the primaries, also 7, 8 and 9 are stalked as in *Perola murina,* Walk. The following species should be placed in the genus *Perola: Trabala drucei* Schs., *T. brumalis* Schs., *T. circur* Schs., *T. rubens* Schs., *T. druceoides* Dogn., *Asbolia sericea* Mösch.

Perola sucia, sp. nov.

Body brownish yellow, the patagiæ violaceous gray. Primaries fawn color then faintly sinuate to the apex; the portion enclosed by this line is heavily shaded with darker brown. Expanse 30 mm.

Habitat: Jalapa, Mexico.

This species strongly resembles *E. scapha* Harris.

Dalcera obscura, sp. nov.

Dark golden brown, the costal margin of the secondaries somewhat paler. Expanse 21 mm.

Habitat: São Paulo, S. E. Brazil.

Dalcera citrina, sp. nov.

Entirely pale lemon color. Expanse 17 mm.

Habitat: Trinidad, B. W. I.

Eupoeya jamaicensis, sp. nov.

Primaries above silvery white. Secondaries light gray, darker along the outer margin. Underneath primaries grayish with the veins white, and a terminal dark gray line. Secondaries below white with the outer margin dark gray. Expanse 17 mm.

Habitat: Jamaica, B. W. I.

The neuration of this species agrees with *Eupoeya nivalis* Pack.

Cyclara, gen. nov.

Wings short and rounded. Primaries—vein 3 from lower angle of cell; 4 and 5 from angle in discocellular; 7, 8, 9 from very long stalk at upper angle of cell 10 also from upper angle of cell. Secondaries with veins 3 and 4 from lower angle of cell; 5 and 6 from discocellular; 7 from upper angle. Antennæ pectinated.

Cyclara ovata, sp. nov.

Wings rather diaphanous brownish gray. Primaries with a darker basal shade and a median transverse dentate and irregular brown line outwardly edged with white, which is more distinct on the inner half of the wing; a small subapical dark brown spot. Expanse 19 mm.

Habitat: São Paulo, S. E. Brazil.

Carama flavescens, sp. nov.

Body and primaries yellowish white. Secondaries white. The wings rather thinly scaled. Expanse 40 mm.

Habitat: São Paulo, S. E. Brazil.

Carama grisea, sp. nov.

Head and thorax brownish white. Abdomen grayish brown. Wings grayish brown, a white spot at the end of the cell on the primaries. Expanse ♂ 32 mm.

Habitat: São Paulo, S. E. Brazil.

Carama parva, sp. nov.

Entirely pure milky white. Expanse ♀ 30 mm.

Habitat: Castro, Parana.

Trochuda impura, sp. nov.

Head and thorax yellowish. Abdomen white, subdorsally fawn color. Primaries whitish yellow; two oblique parallel brownish lines, one at a third from the base, the other from the apex to the middle of the inner margin. Secondaries white. Expanse ♀ 43 mm.

Habitat: São Paulo, S. E. Brazil.

Megalopyge lapena, sp. nov.

Body whitish gray, with indistinct transverse brown shades. Primaries very pale brownish gray, whiter beyond the cell and between the veins near the outer margin; at the end of the cell a small reddish brown spot; below the median vein a large reddish brown spot composed of long crinkly scales. Secondaries and underneath yellowish white. Expanse ♂ 35 mm.

Habitat: Jalapa, Mexico.

Megalopyge fieldia, sp. nov.

♂. Head white, brown behind. Collar white anteriorly, brown posteriorly. Thorax brown edged with white in front and with two white tufts posteriorly. Abdomen brown with a subdorsal row of white tufts. Primaries with the basal half brown except the costa which is white with a few long brown streaks; a dark brown spot at the end of the cell; the outer half of the wing brown with the veins whitish and two transverse white lines breaking the brown up into irregular spots; there are also some white longitudinal streaks between the veins on the outer margin. Secondaries brown; white at the base of the costal margin; some whitish spots on the fringe. Underneath brown, some; white marginal streaks; the inner margin of the primaries broadly white. Expanse 45 mm.

Habitat: São Paulo, S. E. Brazil.

Megalopyge vipera, sp. nov.

♀. Head brown. Collar white. Thorax brown. Abdomen brown with a fe
grayish scales subdorsally. Primaries brown, the basal two-thirds with crinkl

and the median nervure the veins are whitish; fringe cream color. Secondaries creamy with the veins and some scales at the base darker.

♀. Almost entirely smoky brown; the fringe cream color; at the base and near the apex of the primaries some white scales; the median space mottled with blackish crinkly scales. Expanse ♂ 34 mm. ♀ 50 mm.

Habitat: Orizaba, Mexico.

Named after my assistant collector, Mateo Trujillo.

Citheronia aroa, sp. nov.

Head and thorax reddish, the latter yellow beneath the patagiæ. Abdomen red with transverse yellow bands. Primaries above mouse gray; a bright yellow spot at the base; an orange spot in the cell and a large similar spot below the median vein; an outer row of orange spots from near the apex to the inner margin, followed by a broad irregular orange band. Secondaries orange, shaded with red at the base; a red spot in the cell and a narrow transverse dark red line, shaded with gray at the anal angle. Underneath the markings are the same as in *C. mexicana* Grote & Rob., to which this species comes nearest. Expanse ♂ 85 mm.

Habitat: Aroa, Venezuela.

Citheronia azteca, sp. nov.

Head red with some white hairs under the antennæ. Collar white, broadly margined with red posteriorly. Thorax red with three yellow lines. Abdomen red; a large white subdorsal spot at the base and a fine yellowish band posteriorly on each segment. Primaries gray with all the veins broadly red; at the base two creamy spots; a similar spot at the end of the cell and an outer row of transverse creamy spots between the veins; fringe on the inner margin red. Secondaries above bright yellow, the veins red; a large red space at the base and a red spot at the end of the cell; a transverse narrow gray shade to the anal angle and some grayish spots between the veins on the outer margin. In the ♀ the secondaries have the yellow replaced by gray with two wavy yellow transverse bands. Expanse ♂ 105 mm. ♀ 108 mm.

Habitat: Jalapa, Mexico.

Allied to *C. splendens* Druce, but quite distinct.

Adelocephala acuta, sp. nov.

Body pinkish fawn color. Primaries very acute at the apex, reddish fawn color shaded with lilacine at the base and on the outer margin; two fine transverse brown lines, one from near the middle of the costa to the inner margin at a third from the base, the other from the apex to the inner margin at two-thirds from the base; in the cell an indistinct grayish spot containing a minute white point. Secondaries reddish brown color with a large cluster of dark red hairs on the inner margin. Underneath the primaries are orange with a triangular gray space occupying the outer margin and a large black spot with a white point at the end of the cell. Secondaries fawn color with an indistinct transverse line. Expanse ♂ 55 mm.

Habitat: Aroa, Venezuela.

Heliconisa catherina, sp. nov.

Body fawn color; antennæ black. Wings with the basal two-thirds fawn color, becoming diaphanous outwardly; the outer third of the wings black with some indistinct brownish streaks between the veins; a brownish spot at the end of the cells. Expanse ♂ 100 mm.

Habitat: Santa Catherina, S. E. Brazil.

Dirphia bertha, sp. nov.

Head reddish. Thorax black, the patagiæ edged with yellow. Abdomen red in the ♂, brownish in the ♀. Primaries above very dark gray; all the veins orange edged on either side with pale yellow; a yellowish streak in the cell, and another between the median and submedian veins; at the end of the cell a small dark red spot circled with black. Secondaries in the ♂ red with long yellow hairs at the base; the outer margin black interrupted by yellow veins; fringe yellow; a large black spot with a brownish centre crossed by a white line at the end of the cell. In the ♀ the secondaries are pinkish shading to gray on the outer margin, where the veins are tinged with yellow; the discal spot as in the male. Underneath the wings are dull gray in the ♀ with yellowish veins; in the ♂ the primaries below are red and the disc of the secondaries yellowish with broad black margins, all the veins being yellowish. Expanse ♂ 88 mm. ♀ 74 mm.

Habitat: Castro, Parana.

I name this beautiful species Bertha in honor of the wife of E. D. Jones, Esq., who has done so much to give us a knowledge of the fauna of Southeast Brazil.

Dirphia taglia, sp. nov.

Head and thorax brown, the latter with a few white hairs. Abdomen red dorsally, whitish laterally and underneath. Primaries brown; near the base three lilacine transverse bands; a dark spot in the cell; a dentate outer brown line shaded on either side with lilacine; a subterminal brownish indistinct line beyond which the outer margin is lilacine gray. Secondaries brown with an outer and a submarginal

THE PHOSPHORESCENT ORGANS OF INSECTS.

By A. S. PACKARD.

The nature of the phosphorescent organs and their physiology has never seriously engaged the attention of students in this country, and I have thought that some account compiled from the latest and best researches might stimulate inquiry in this country, where fire-flies are universally common.

Phosphorescence is not infrequent in the Protozoa, Cœlenterates, Worms, and has been observed in the bivalve Pholas, in a few abyssal Crustacea, in Myriopods (*Geophilus*), in an Ascidian, Pyrosoma, and in certain deep-sea fishes.

In insects luminosity is mostly confined to a few Coleoptera, and besides the well-known fire-flies, an Indian Buprestid (*Buprestis ocellata*) is said to be phosphorescent; also a Telephorid larva. Other luminous insects are the Poduran *Anurophorus*, *Fulgora*, and certain Diptera (*Culex* and *Tyreophora*).

The seat of the light is the intensely luminous areas situated either in the head (Fulgora), in the abdomen (Lampyridæ), or in the thorax (in a few Elateridæ of the genus Pyrophorus). The luminous or photogenic organ is regarded by Wielowiejsky and also by Emery as morphologically a specialized portion of the fat-body, being a plate consisting of polygonal cells, situated directly under the integument, and supplied with nerves and fine tracheal branches.

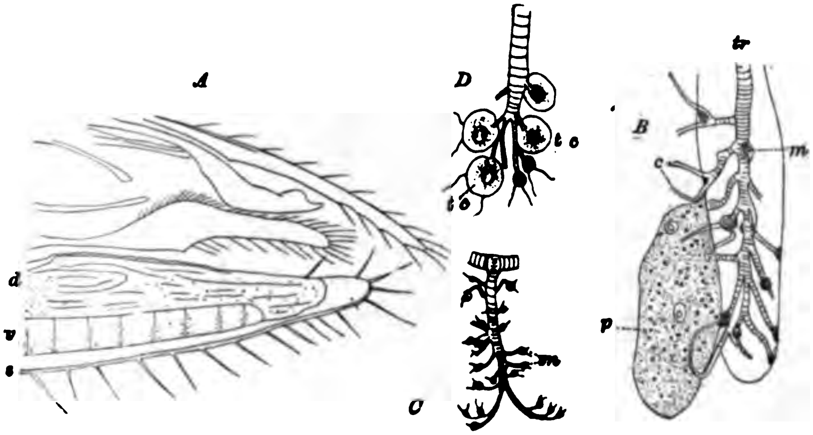


Fig. A. Sagittal section through the hinder end of a male *Luciola*; the organs above the phosphorescent plate only drawn in outline. *s*, integument of the last segment, somewhat removed by the section-knife from the phosphorescent tissues.

d, dorsal layer of the phosphorescent plate penetrated by irregular tracheal branches, and rendered opake by numerous urate concretions imbedded in it; *v*, ventral phosphorescent layer of the plate, with perpendicular tracheal stems whose branches, where they pass into capillaries bear lumps which stain brown with osmic acid. *n*, structurless substance (coagulum?) filling the end of the last ventral segment. B. Isolated portion of the ventral layer of the phosphorescent plate, *tr.* tracheal stem surrounded by a cylindrical lobe; *p*, parenchym-cell attached to the cylinder; *c*, capillary, without the spiral threads; *m*, coagulum stained brown. C. a tracheal stem of the ventral layer: at the fork of the brown-stained capillaries are lumps stained brown with osmic acid. D. a part of C. more highly magnified showing the remains of the tracheal end-cells (*tc*) enveloping the brown lumps (*m*)—after Emery.

In *Luciola* as well as in other fire-flies, including *Pyrophorus*, the phosphorescent organ or plate consists, as first stated by Kölliker, of two layers lying one over the other a dorsal one (*d.*) which is opake, chalky white, and non-photogenic, and a lower one (*v.*), the active photogenic layer, which is transparent. Through the upper or opake layer and on its dorsal surface extend large tracheæ and their horizontal branches, from which arise numerous very fine branches which pass down perpendicularly into the transparent or photogenic layer of the organ. Each tracheal stem, together with its short branches is enveloped by a cylindrical mass of transparent tissue, so that only the short terminal branches or very fine tracheal capillaries project on the upper part of the cylinder. These finest tracheal capillaries are not in *Luciola* filled with air, but with a colorless fluid, as was also found by Wielowiejsky and others in Lampyris.

These transparent cylinders, with the tracheæ within, forming longitudinal axes, resemble lobules. These lobules are so distributed that they appear on a surface section of this plate as numerous round

[redacted] luminous body by the tracheæ, which branch
up into capillaries."

males of *Luciola* display their light in two
they are active or flying the light is given
rvals, causing the well-known sparkling or
atch a flying *Luciola* or pull apart one rest-
off its hind body, it gives out a tolerably
ly reaching the intensity of the light-waves
this case the light is constant, yet we notice,
insect, that the phosphorescent plate in its
but glows at different places as if phos-
it.

microscopic observation of the light of the
possible, but an animal while giving out its
, may readily be placed under the micro-
derably high powers. By making the ex-
Emery saw clear shining rings on a dark
are not equally lighted. Comparing this
investigation, and it is seen that the rings
previously described circular tracheal capil-
n the tracheal-cell cylinder and the paren-
-cells are never stained of a deep brown;
ay be the seat of the light-producing oxy-
of oxydation takes place in the upper surface
but outside of their own substance. The
ecrete the luminous matter; this is taken up
and burnt or oxydized by means of the oxygen
pillaries. Such a combustion can only take
membrane of the tracheae is extraordinarily
as is the case in the capillaries of the photo-
plasma of the tracheal cells only oxydizes at
tracheal twigs and in the capillaries." (Emery.)

ght of *Luciola* is identical in the two sexes, and
ne same, though that of the female is more re-
of the flashes of light given out by the male is
ashes briefer, while those of the female are longer,
appear at longer intervals.

: What is the use of this luminosity? Is it only to
Luciola, which are so much rarer than the males?
eral view that it is ig act, he thinks that
r danger-signal

The spectrum of the light of the cucujo was found by Pasteur to be continuous. (C. R. French Acad. Sc. 1864, ii, p. 509.) A later examination by Aubert and Dubois, showed that the spectrum of the light, examined by the spectroscope is very beautiful, but destitute of dark bands. When, however, the intensity diminishes, the red and orange disappear, and the green and yellow only remain.

Heinemann studied the cucujo at Vera Cruz, Mexico. At night in a dark room it radiates a pale green light which shows a blue tone to the exclusion of any other light. The more gas or lamp light there is present, the more apparent becomes the yellowish green hue, which in clear daylight changes to an almost pure very light yellow with a very slight mixture of green. "In the morning and evening twilight, more constantly and clearly in the former, the cucujo light, at least to my eyes, is an intensely brilliant yellow with a slight mixture of red. In a dark room lighted with a sodium light the yellow tone entirely disappears; on the other hand the blue strikingly increases." As regards the spectrum he found that almost exactly half of the blue end is wanting and that the red part is also a little narrower than in the spectrum of the petroleum flame.

Prof. C. A. Young states that the spectrum given by our common firefly (*Photinus ?*) is perfectly continuous, without trace of lines either bright or dark. "It extends from a little above Fraunhofer's line C, in the scarlet, to about F in the blue, gradually fading out at the extremities. It is noticeable that precisely this portion of the spectrum is composed of rays, which while they more powerfully than any others affect the organs of vision, produce hardly any thermal or actinic effect. In other words, very little of the energy expended in the flash of the fire is wasted. It is quite different with our artificial methods of illumination. In the case of an ordinary gas light the best experiments show that not more than one or two per cent. of the radiant energy consists of *visible rays;* the rest is either invisible heat or actinism; that is to say, over 98 per cent. of the gas is wasted in producing rays that do not help in making objects visible." (Amer. Nat. iii, 1870, p. 615).

Panceri also remarks that while in the spectroscope the light of some Chætopteri, Beroë and Pyrosoma, exhibit one broad band like that given by monochromatic light, that of *Lampyris* and *Luciola* is polychromatic (Amer. Nat. vii, 1873, p. 314.)

The physiology of insect-phosphorescence is thus briefly stated by Lang: "The cells of this luminous organ secrete, under the control of the nervous system, a substance which is burnt during the appearance of the light; this combustion takes place by means of the oxygen conveyed to the cells of the luminous body by the tracheæ, which branch profusely in it and break up into capillaries."

Emery states that the males of *Luciola* display their light in two ways. When at night time they are active or flying the light is given out at short and regular intervals, causing the well-known sparkling or scintillating light. If we catch a flying *Luciola* or pull apart one resting in the day time, or cut off its hind body, it gives out a tolerably strong light, though not nearly reaching the intensity of the light-waves of the sparkling light. In this case the light is constant, yet we notice, especially in the wounded insect, that the phosphorescent plate in its whole extent is not luminous, but glows at different places as if phosphorescent clouds passed over it.

It is self-evident that a microscopic observation of the light of the glow-worm or fire-fly is not possible, but an animal while giving out its light, or a separated abdomen, may readily be placed under the microscope and observed under tolerably high powers. By making the experiment in a rather dark room Emery saw clear shining rings on a dark background. "All the rings are not equally lighted. Comparing this with the results of anatomical investigation, and it is seen that the rings of light correspond with the previously described circular tracheal capillaries, *i. e.*, the limits between the tracheal-cell cylinder and the parenchym-cells. The parenchym-cells are never stained of a deep brown; this proves that its plasma may be the seat of the light-producing oxydation. Hence this process of oxydation takes place in the upper surface of the parenchym-cells, but outside of their own substance. The parenchym-cells in reality secrete the luminous matter; this is taken up by the tracheal end-cells and burnt or oxydized by means of the oxygen present in the tracheal capillaries. Such a combustion can only take place when the chitinous membrane of the tracheae is extraordinarily fine and easily penetrable, as is the case in the capillaries of the photogenic plate; therefore the plasma of the tracheal cells only oxydizes at the forking of the terminal tracheal twigs and in the capillaries." (Emery.)

The color of the light of *Luciola* is identical in the two sexes, and the intensity is much the same, though that of the female is more restricted. The rhythm of the flashes of light given out by the male is more rapid, and the flashes briefer, while those of the female are longer, more tremulous and appear at longer intervals.

Emery then asks: What is the use of this luminosity? Is it only to allure the females of *Luciola*, which are so much rarer than the males? Contrary to the general view that it is an alluring act, he thinks that phosphorescence is a means of defense, or a warning or danger-signal against insectivorous nocturnal animals. If we dissect or crush a *Luciola* it gives out a disagreeable cabbage-like smell, and perhaps this is sufficient to render it inedible to bats or other nocturnal animals. An acrid taste they certainly do not possess.

It has long been known that the eggs of fire-flies, both Lampyridæ and *Pyrophorus*, are luminous. Both Newport and more recently Wielowiejsky attributes the luminosity not to the contents of the egg, but to the portions of the fat-body cells or fluid covering on the outside of the eggs, due to ruptures of the parts within the body of the female during oviposition. The larvæ at different ages are also luminous.

The position of the luminous organs changes with age. In the larvæ of *Pyrophorus* before moulting, according to Dubois, the luminous organs are situated only on the ventral side of the head and prothoracic segment. In larvæ of the second stage there are added three shining spots on each of the first eight abdominal segments, and a single luminous spot on the last segment. These spots are arranged in a linear series and thus form three luminous cords. In the adult beetles there is a luminous spot in the middle of the first abdominal sternite, but the greatest amount of light is produced by the two vesicles on the hinder part of the prothorax, the position of which varies according to the species.

LITERATURE.

Peters, W.—Ueber das Leuchten der *Lampyris italica*. (Müller's Archiv f. Anatomie, 1841, p. 229–233.)

Köllliker, A.—Die Leuchtorgane von Lampyris, eine vorläufige mittheilung. (Verhandl. d. phys. medizin. Gesellsch. Würzburg, 1857, viii, p. 217–224.)

Schultze, Max.—Ueber den Bau der Leuchtorgane der Männchen von *Lampyris splendidula*. (Sitzber. d. niederrhein. Gesellsch. f. Natur. u. Heilkunde zu Bonn, 1864, Sep. p. 7.)

THE PROBABLE ORIGIN AND DIFFUSION OF NORTH AMERICAN SPECIES OF THE GENUS DIABROTICA.—II.

BY F. M. WEBSTER.

Since the publication of my paper in No. 4, Vol. III, of the JOURNAL, a considerable amount of information relative to the subject has since either been communicated to me, or placed at my disposal where I did not before feel at liberty to use in print. I have, therefore, thought best to add this supplementary note, including in it a few corrections.

Professor Cockerell has very kindly prepared the following table illustrating the position of his *D. vittata* var. *incerta*, Ckll. found by him from Mesilla Valley southward to Juarez, Mexico, opposite El Paso, Texas, on the Rio Grande:

A. Antennæ with the three basal joint pale.
  - a. "Legs yellow, the knees, anterior tibiæ and tarsi, and the tips of the middle and posterior tibiæ and their tarsi, piceous." (Horn). **vittata** *Fab.*
  - b. Legs more or less darkened, but basal third of anterior femora, and basal two-thirds of middle and posterior femora, and hind tibiæ more or less in middle, yellow. **vittata** var. **incerta** *Ckll.*

B. Antennæ all black. Legs all black except bases of femora. **trivittata** *Mann.*

In regard to the distribution of these in the valley of the Rio Grande, Prof. Cockerell gives me the following table:

7,000 ft.	Santa Fé,	*D. 12-punctata*, (1 specimen not taken by himself).
	Gallinas Cañon,	*D. atripennis*, (reported by the Snow party).
*5,000 "	Albuquerque,	. . . . *D. longicornis*.
*5,000 "	Socorro,	*D. 12-punctata*, . . *D. lemniscata*. Collected by Prof.
3,000 "	Mesilla Valley,	Wickham, at Alberquerque.
*3,—— "	Juarez, Mexico,	*D. tricincta*. *D. vittata* var. *incerta*.

The occurrence at Gallinas Cañon should have been credited to Prof. Snow and not to Prof. Cockerell. Prof. Wickham calls my attention to the fact of Dr. Horn's having observed a close resemblance between *Andrector 6-punctata* Horn, and *Diabrotica 12-punctata* Oliv., while he had himself confused a second species of *Andrector* with *Diabrotica tricincta* Say, and placed them in his collection as all belonging to the latter species. *Andrector* is placed in the same sub-tribe as *Cerotoma* and *Diabrotica*, which would rather oppose the idea of a protective mimicry, though by no means disproving it. We simply need more information in regard to the matter as all may be alike inedible.

---

* These records of elevations are supplied by myself and taken from surveys made by the U. S. Geological Survey and published in 1890. The elevation of Juarez, Mex., opposite El Paso, Tex., is but little less than 3,800 ft.

Since my paper was published, I have found the larvæ of *Diabrotica vittata* so excessively abundant in some greenhouses near Cincinnati, as to entirely ruin the cucumber vines being grown therein. The date of my observations was December 28, and at that time I found adults, and larvæ from one-half to two-thirds grown, but mostly the former.

◆

ON THE PROBABLE ORIGIN OF THE PERICOPIDÆ: COMPOSIA FIDELISSIMA *H.-S.*

By HARRISON G. DYAR, A. M., Ph.D.

The Pericopidæ are a tropical American family of moths with the venation of Noctuidæ, most allied in their colors, perhaps, to the Dioptidæ. Three genera occur in our fauna, *Gnophæla*, *Composia* and *Daritis*.

In placing the North American families in systematic position on their larval characters, I was able to show from the writings of Bruce and Cockerell that the abdominal tubercles of *Gnophæla* were the same as in the Arctiidæ; but was unable to get further in the absence of material and the unfortunate brevity of the published descriptions. Now, As to the origin of this family, three alternatives seem possible: (1) from the Arctiidæ (2) from the Noctuidæ (3) from the Dioptidæ.

(1). This alternative seemed to me at first sight most plausible. However, the subcostal vein of secondaries in the Pericopidæ is free from the radius and the wart formation of the larva is of a simple type. Therefore, if of Arctiid origin, they are a branch representing a more generalized type than the present Arctiidæ. But no confirmatory evidence for this possible origin occurs to me.

(2). By pushing the origin a little further back, we reach a derivation from the Noctuidæ. This involves an independent wart formation from that in the Arctiidæ; that is that we may suppose that the Arctiidæ and Pericopidæ arose simultaneously, or nearly so, from Noctuid ancestors, but independently and with separate larval wart formation, the Pericopidæ remaining the more generalized. I do not think of any confirmatory evidence for this view.

(3). The Pericopidæ and Dioptidæ differ in that in the former cubitus is four-branched while three-branched in the latter. This distinction is not sharp, since in *Gonora heliconiata* (a Pericopid) vein 5 arises only a short distance below the fold representing media. In *Dioptis pheloides*, *Phryganidia californica* and *Tithraustes haemon* (Dioptidæ), vein 5 is a distinct continuation of medial fold. The families almost intergrade, as the confusion in the genera in Kirby's catalogue bears witness.

The larvæ of the Dioptidæ (only known to me in Phryganidia) have single Noctuidous setæ. To derive the Pericopidæ from them, we must suppose an independent wart formation analogous to that of the Apatelidæ from the Noctuidæ or the Eupterotidæ from the Notodontidæ, but simpler than either.

Now as confirmatory evidence, we have in the moths the marked similarity in build and pattern of coloration; also a tendency in both families to the coalescence of veins 3 and 4, not seen in the Noctuidæ and Arctiidæ. The Noctuid habitus of the larva is also equally consonant with an origin from the generalized Noctuiform Dioptid larva as from any existing type of the Noctuidæ.

I think that we may conclude, therefore, that the Pericopidæ are a family representing a specialized form of Dioptidæ, with independent moving of vein 5 toward 4 and wart formation in the larvae. Their geographical distribution is also in favor of this conclusion, since, being confined to America, their origin from the strictly American Dioptidæ is more reasonable than from either of the world wide Noctuidæ or Arctiidæ.

Finally a word concerning the origin of the Dioptidæ to trace the ancestry a step further. In this Journal (Vol. iii, p. 30–32), Dr. Packard argues for the derivation from a common ancestor of the "Geometrids, Dioptids, Hypsids and Syntomids" = Euchromiidæ. It is true he makes this ancestor to be the Lithosiidæ, why I am unable to imagine. We have no evidence of the extensive degeneration which is implied in deriving the simple Geometrids and Hypsids (a low Noctuidous type) from the highly specialized Lithosiidæ, with their four-branched cubitus and modified wart formation in the larvæ. To my mind, the present group nearest to the ancestral form of the Noctuina (which includes the four families mentioned by Dr. Packard) is the Notodontidæ.* We see in them a combination of the generalized position of vien 5 with the single haired tubercle of the larva. The two families next nearest this stem are the Dioptidæ on one side and the Geometridæ on the other. Therefore I agree with Dr. Packard's main proposition, and we may derive the Dioptidæ from low on the main stem of the Noctuina, near the ancestors of the Geometrids, as illustrated in the genealogical tree shown on the accompanying plate (Plate III, fig. 9).

COMPOSIA FIDELISSIMA: ITS LIFE HISTORY.

1866—Herrich-Schäffer, Cor. Blatt. Reg. XX, 131.
1867—Grote, Proc. Ent. Soc. Phil. VI, 303.
1890—Dyar, Ent. News, I, 105.
1891—Dyar, Ent. News, II, 50.
1892—Kirby, Cat. Lep. Het. I, 190.
1894—Neumoegen & Dyar, Journ. N. Y. Ent. Soc. II, 26.
Composia olympia BUTLER.
1871—Butler, Ann. Nat. Hist. (4) VIII, 290.

warts dusky, those on the purple segments blue-black; thoracic feet and leg plates black; hair black, strong and stiff, singly from the warts, spinulated and pointed. The arrangement of the tubercles is normal for the primitive first stage of the Noctuina. (Plate III, fig. 2).

Stage II.—Head .8 mm. Warts many haired, the hairs black except a pair of long white ones which overhang the head, arising from the upper wart on joint 3. The warts have a central hair and radiating crown of secondary hairs except iv, which is single haired. Wart vi present, large. On the thorax there are two warts above the stigmatal wart closely approximated. The coloration is as before.

Stage III.—Head 1.1 mm. The dark segments of the body are mottled by the general orange tint; otherwise as before. This differs from the next stage in being more decidedly orange, the blackish shadings more livid.

Stage IV.—Head 1.6 mm. Like the mature larva.

Stage V.—Head 2.2 mm. No change except in size.

Stage VI.—Head 2.8 mm. From the width of the head this is an interpolated stage, but it was persistently passed through by all the larvæ observed at first. Later some examples of a brood omitted it and in these the width of head in Stage V was about 2.5 mm.

Stage VII.—General appearance beautiful bright crimson and shining violet blue, sparsely hairy. Head and body crimson red, not shining; warts shining red, certain of them shining violet-blue, the areas around these warts discolored, blackish. Spiracles pale orange. On joints 2 to 4, only the two lowest warts bluish; on 5, 6, 9, 10 and 11 all the warts blue, the blackish shades predominating subdorsally; on joints 7, 8 and 12 warts iv to vi bluish. This distribution of color is subject to some variation. Hairs sparse, only 8–10 to a wart, stiff, barbuled, rather short, black; from wart i on joint 3 and from i on joint 13 a single stiff white hair, four times as long as any other, projects forward and back, probably serving as a tactile organ. In many instances one or both of the posterior hairs are missing. Warts i to vi and leg-plate normal, iv rather small; on joint 3, i and iia nearly fused but separable, more remote on 4; ii*b* rudimentary, a single hair; iii a single hair; iv + v and vi normal warts; on joint 2, hairs from the anterior and posterior edges of cervical shield, a wart before the spiracle and a subventral wart. Head setæ simple (Plate III, fig. 4); width 3.2—3.4 mm. The mature larva is figured on the plate (fig. 3).

Cocoon.—This can scarcely be called such. It consists of a few threads which serve to entangle the hooks on the head and cremaster.

Pupa.—(Plate III, fig. 5). Cases large, compacted, a large prominent knob at the base of the wing case; abdomen small, conically tapering, but enlarged on the dorsal side toward the base; three moveable incisures. The lines of the wing veins and the abdominal segments are marked by punctures. Corresponding to the position of the larval warts and to the legs are a series of tufts of flattened straw-colored scales. Two pairs of hooks on the head (Plate III, fig. 8), and many strong ones on the cremaster (Plate III, fig. 7). The color is a rich mahogany red with blue and violet shadings especially on the wing cases. Length 20, width 7 mm.

Food Plant.—The leaves of *Echites umbellata.* Kindly determined by Mr. F. Kinzel, to whom I am also indebted for a supply of the plant. In confinement the larvæ will also eat oleander, but did not occur on this plant in nature. Mrs. Slosson informs me that she has found the larvæ on *Canavalia obtusa.*

Habitat.—This species reaches us from Brazil, being found also in Central America and the West Indies. It is abundant in Key West, as I learn from Mr. Brownell, and its northernmost record is on the strip of land between Indian River and the sea. Eggs, larvæ in all stages and moths were found at the same time, and the species doubtless breeds continuously.

◆

THE LARVA OF SYNTOMEIDA EPILAIS *Walk.*

EXPLANATION OF PLATE III.

Fig. 1. Egg of *Composia fidelissima* enlarged × 20.
" 2. Larva, stage I × 18.
" 3. Mature larva, natural size.
" 4. Front view of the head × 10, showing the setæ.
" 5. Pupa, slightly enlarged.
" 6. A group of scales from the body of the pupa × 40.
" 7. Some of the hooks of the cremaster × 30.
" 8. One of the head hooks × 40.
" 9. Genealogical tree of the Lepidopterous superfamily Noctuina, showing the probable origin of the North American families from a Tineid stock. The European Lemoniidæ are included as a connecting link. The narrow cross bars indicate points at which cubitus became 4-branched on the fore wings; the broad shaded bars, points at which the larva-tubercles became warts.
" 10. Mature larva of *Syntomeida epilais*, natural size.

◆

FOOD-HABITS OF NORTH AMERICAN CERAMBYCIDÆ.

By William Beutenmuller.

In the American Entomologist, Vol. III, 1880, pp. 237 and 270, the late Dr. C. V. Riley published a paper on the food-habits of the long-horn beetles or wood-borers. Since then considerable has been added to our knowledge on the food-habits of this family of beetles. It has therefore been deemed advisable to republish Dr. Riley's paper with such additions which have been made. For personal credit the reader is referred to Dr. Riley's paper and Packard's Fifth Report U. S. Entomological Commission. We are also indebted to Mr. L. H. Joutel for many notes incorporated in the present paper and which have not been published elsewhere.

Ergates spiculatus *Lec.*—This western species is recorded as living in the roots of coniferous trees, especially pine.

Mallodon dasystomus *Say.*—Bores in the wood of oak, hackberry (*Celtis*) and pecan hickory, and undoubtedly other species of hickory.

Mallodon melanopus *Linn.*—Lives in box elder (*Negundo aceroides*), oak and hackberry (*Celtis*).

Mallodon serrulatus *Lec.*—Breeds in hackberry (*Celtis*), and probably also oak.

Orthosoma brunneum *Forst.*—Bores in decaying pine, hemlock and probably other coniferous trees, also in hickory, walnut, oak and chestnut.

Prionus laticollis *Drury.*—Lives in the trunks and roots of linden poplar, oak, chestnut, apple, pine and grapevine.

Prionus californicus *Mots.*—Breeds in decaying stumps and roots of live-oak.

Prionus pocularis *Dalm.*—Infests the roots and stumps of pine.

Prionus imbricornis *Linn.*—Lives in roots of grapevine, pear trees and herbaceous plants.

Homoæsthesis emarginatus *Say.*—Is supposed to live in trunk and roots of pine.

Tragosoma harrisii *Lec.*—Breeds in stumps of decaying pine trees.

Asemum mœstum *Hald.*—Lives under and in the bark of oak, pine, spruce and other conifers and also in roots of grapevine.

Asemum atrum *Esch.*—Bores in the trunk of pine trees.

Criocephalus nubilus *Lec.*—Lives in the roots of pine, as does *C. agrestis* Kby., and probably also the other species of the genus.

Smodicum cucujiforme *Say.*—Breeds under bark of oak, hackberry and beech.

Physocnemum brevilineum *Say.*—Lives in dry wood of elm trees.

[illegible]

Callidium antennatum *Newm.*—Breeds under the bark of pine and cedar (*Juniperus*), making tortuous galleries.

Callidium janthinum *Lec.*—Lives under bark of pine.

Callidium æreum *Newm.*—Has been bred from chestnut logs.

Oeme gracilis *Lec.*—Lives in dead wood of oak (*Quercus agrifolia*) in California.

Dryobius sexfasciatus *Say.*—Lives in oak and beech, under the bark.

Gracilia minuta *Fabr.*—Breeds in the wood of the sweet birch (*Betula lenta*). Raised from oak twigs by Mr. Joutel.

Chion cinctus *Drury.*—Bores in the trunk of hickory.

Eburia 4-geminata *Say.*—Lives in the trunk of honey-locust, hickory and probably also in ash.

Romaleum atomarium *Dr.*—Bores in the twigs of oak, hackberry (*Celtis*), and in the dry leaf stems of palmetto.

Elaphidion inerme *Newm.*—Bores in the twigs of oak and orange.

Elaphidion mucronatum *Fabr.*—Bores in twigs of oak, hackberry, palmetto and grapevine.

Elaphidion parallelum *Newm.*—Breeds in twigs of oak, hickory plum, apple and grape.

Elaphidion villosum *Fabr.*—Lives in the twigs of oak, hickory, beech, chestnut, birch, sumac, plum, apple and grapevine.

Elaphidion irroratum *Fabr.*—Bores in the trunk of black mangrove in Florida.

Tylonotus bimaculatus *Hald.*—Found under bark of tulip tree, also lives in ash and dead hickory.

Heterachthes 4-maculatus *Newm.*—Breeds in branches of hickory.

Phyton pallidium *Say.*—Lives in branches of hickory.

Megobrium edwardsii *Lec.*—Lives in wood of live-oak in California.

Molorchus bimaculatus *Fabr.*—Has been bred from hickory branches, also bores in maple twigs.

Callichroma splendidum *Lec.*—Breeds in wood of gum-elastic tree in Texas.

Megaderus bifasciatus *Dup.*—Has been taken from cedar timber in Texas.

Tragidion coquus *Linn.*—Bores in oak.

Tragidion armatum *Lec.*—Breeds in the flower stalks of *Yucca angustifolia* (Townsend).

Purpuricenus humeralis *Fabr.*—Lives in oak stumps.

Schizax senax *Lec.*—Lives in dead wood of apricot.

Stenophenus notatus *Oliv.*—Breeds in dead hickory limbs.

Cyllene antennatus *White.*—Lives in the wood of mesquite in Arizona.

Cyllene picta *Drury.*—Bores in the solid wood under the bark of hickory, walnut, butternut and occasionally in the honey-locust (*Gleditschia*).

Cyllene robinæ *Forst.*—Very destructive to the trunks of locust.

Cyllene crinicornis *Chev.*—Has been taken in Texas on sycamore (*Platanus*), in the wood of which the species probably breeds.

Plagionotus speciosus *Say.*—Lives in the solid wood of sugar maple.

Calloides nobilis *Say.*—Breeds in chestnut and oak trees; also beaten from hickory by Mr. Joutel.

Arhopalus fulminans *Fabr.*—Bores in the sap wood of chestnut and oak.

Xylotrechus annosus *Say.*—Breed in the wood of willow.

Xylotrechus convergens *Lec.*—Has been bred from a branch

Neoclytus luscus *Lec.*—Breeds in hickory limbs and probably also in the trunk of the tree.

Neoclytus capræa *Say.*—Bores in ash, elm and hickory, limbs and trunks.

Clytanthus albofasciatus *Lap.*—Lives in the limbs of hickory and in the wood of the grapevine. *C. ruricola* also breeds in hickory.

Microclytus gazellula *Hald.*—Bores in the branches of oak.

Cyrtophorus verrucosus *Oliv.*—Lives in the wood of wild red cherry and quince; has also been beaten from hickory.

Tillomorpha geminata *Hald.*—Has been bred from branches of hickory.

Euderces pini *Oliv.*—Occurs on pine trees.

Euderces picipes *Fabr.*—Has been raised from hickory and chestnut branches.

Zagymnus clerinus *Lec.*—Bores in the dry leaf stems of palmetto in Florida.

Atimia confusa *Say.*—Occurs on pine tree.

Distenia undata *Oliv.*—Bores in the wood of chestnut and hornbeam (*Carpinus*).

Desmocerus palliatus *Forst.*—Lives in the lower parts of the stems of elder. *D. auripennis*, also lives in the same plant.

Rhagium lineatum *Oliv.*—Lives under the bark of pine and spruce.

Anthophilax mirificus *Bland.*—Has been found under the bark of spruce (*Abies menziesii*).

Gaurotes cyanipennis *Say.*—Has been found ovipositing on butternut and oak.

Bellamira scalaris *Say.*—The beetle and pupa of this species have been taken under bark of the yellow birch (*Betula lutea*), also found ovipositing on maple.

Typocerus zebratus *Fabr.*—This species mines the oak.

Leptura zebra *Oliv.*—Inhabits the oak, chestnut and pine.

Leptura vagans *Oliv.*—Lives in wood of yellow birch (*Betula lutea*).

Leptura emarginata *Fabr.*—Has been found ovipositing in limbs of white oak by Mr. Joutel.

Leptura abdominalis *Hald.*—Lives in the wood of red cedar (*Juniperus*).

Leptura canadensis *Fabr.*—Breeds in the trunk of hemlock (*Tsuga Canadensis*).

Ipochus fasciatus *Lec.*—Lives in the wood of sumac (*Rhus integrifolia* and *laurina*). *I. pubescens* Casey, has similar habits.

Monilema.—The species of this genus are said to feed on various species of prickly pear, and the larvæ probably live in the wood and roots of these plants.

Cyrtinus pygmæus *Hald.*—Has been bred from locust (*Robinia pseudacacia*), also beaten from hickory.

Psenocerus supernotatus *Say.*—Lives in the wood of dogwood (*Cornus*), apple, and in the stems of the currant.

Monohammus.—The larvæ of this genus bore in the solid wood and in large branches of pine, fir (*Abies*), and probably other coniferous trees.

Dorcaschema nigrum *Say.*—Breeds in dead limbs of hickory.

Dorcaschema alternatum *Say.* — Found in mulberry and osage orange. *D. wildii* is also found on these trees, and their larvæ probably live in the roots or trunks.

Hetœmis cinerea *Oliv.*—Has been taken on mulberry (*Morus rubra*), and probably lives in the wood of this tree.

Cacoplia pullata *Hald.*—Beaten from oak by Mr. Joutel.

Goes tigrina *De G.*—Bores in the solid wood of hickory, oak and walnut, but seems to prefer white oak.

Goes pulchra *Hald.*—Bores in various species of hickory.

Goes pulverulenta *Hald.*—Breeds in the branches of beech (*Fagus ferrugineus*) and hornbeam (*Carpinus*).

Goes oculata *Lec.*—Found on hickory also *G. debilis*, which also breeds in oak branches.

Goes tessellata *Hald.*—Breeds in oak.

Plectodera scalator *Fabr.*—Bores in the roots of cottonwood (*Populus*) and willow.

Acanthoderes 4-gibbus *Say.*—Breeds in the twigs of hickory, oak, beech and hackberry (*Celtis*).

Acanthoderes decipiens *Hald.*—Bores in twigs of hickory.

Acanthoderes morrisii *Uhler.*—Lives in twigs of the tulip-tree.

Leptostylus aculiferus *Say*.—Breeds under bark of sweet-gum (*Liquidambar*), oak and apple; also reported as boring in osage orange.

Leptostylus biustus *Lec*.—Lives in dead branches of orange in Florida. Breeds in hickory twigs (Joutel).

Leptostylus commixtus *Hald*.—Breeds in the wood of locust.

Leptostylus macula *Say*.—Lives in the twigs and under bark of chestnut, oak, hickory, walnut, apple and butternut.

Liopus variegatus *Hald*.—Has been bred from dead chestnut branches.

Liopus fascicularis *Harr*.—Bores in dead wood of prickly-ash (*Xanthoxylus*) and locust.

Liopus cinereus *Lec*.—Has been bred from twigs of locust and hickory.

Liopus crassulus *Lec*.—Bores in dead twigs of hackberry (*Celtis*) in Texas.

Liopus alpha *Say*.—Breeds in the twigs of sumac (*Rhus glabra*) and apple.

Dectes spinosus *Say*.—Has been bred from the stems of the great ragweed (*Ambrosia trifida*).

Lepturges querci *Fitch*.—Breeds in the twigs of hickory, also beaten from oak.

Lepturgus fascetus *Say*.—Bred from apple branches by Mr. Joutel.

Lepturges symmetricus *Hald*.—Bred from chestnut branches by Mr. Joutel.

Hyperplatys aspersus *Say*. – Lives in dry twigs of poplar (cottonwood), hickory and has also been beaten from chestnut.

Hyperplatys maculatus *Hald*.—Lives in dead parts of the orange in Florida; also breeds in dry twigs of apple, hickory and poplar.

Urographis fasciatus *De G*.—Lives under the bark of oak, maple and hickory; bred from apple and pear by Mr. Joutel; also beaten from limbs of chestnut.

Urographis triangularis *Hald*.—Bores under the bark of hackberry (*Celtis*).

Acanthocinus nodosus *Fabr*. and **A. obsoletus** *Oliv*.—The larvæ of both these species live under the bark of pine. The latter species also breeds in hickory.

Hoplosia nubila *Lec.*—Larva bores in dry beech and basswood twigs.

Pogonocherus mixtus *Hald.*—Bores in the branches of willow.

Ecyrus dasycerus *Say.*—Larva bores in the twigs of hickory and locust.

Eupogonius vestitus *Say.*—Bred from hickory and beaten from chestnut.

Eupogonius tomentosus *Hald.*—Larva mines the branches of the pine.

Oncideres cingulata *Say.*—Lives in the twigs of hickory, persimmon, oak, cherry, apple, pear, orange, and said to also affect other trees.

Oncideres putator *Thom.*—Larva lives in the twigs of the mesquite in Arizona.

Ataxia crypta *Say.*—Bores in dry cotton stalks, and in dry twigs of hackberry (*Celtis*), box elder (*Negundo aceroides*), and oak.

Hippopsis lemniscata *Fabr.*—The full grown insect and larva has been found in the stalk of *Ambrosia.*

Saperda obliqua *Say.*—Bores in the trunk of the common alder.

Saperda calcarata *Say.*—Bores in the solid wood in the trunk of poplar and also said to live in linden.

Saperda candida *Fabr.*—Lives in the trunks of apple, pear, plum, quince, cherry, thorn, mountain-ash, and june-berry (*Amelanchier*).

Saperda fayi *Bland.*—Breeds in the branches of thorn (*Cra-*

Saperda puncticollis *Say.*—Breeds in poison-ivy (*Rhus toxicodendron*).

Mecas inornata *Say.*—Bores in the roots and lower part of the stems of *Helenium tenuifolium*, also recorded as living in the shoots of willow and poplar.

Oberea bimaculata *Oliv.*—Burrows in the stems of blackberry and raspberry.

Oberea schaumii *Lec.*—Larva bores in the twigs of cottonwood (poplar).

Oberea mandarina *Fabr.*—Bores in the twigs of poplar.

Oberea quadricallosa *Lec.*—Lives in the stems of willow.

Tetraopes tetraophthalmus *Forst.*—The larva bores in the roots and lower parts of the stem of milkweed (*Asclepias*). The larvæ of the other species of the genus probably also live in a similar manner.

Dysphaga tenuipes *Hald.*—Breeds in dead limbs of hickory.

◆

NOTE ON GEOGRAPHICAL DISTRIBUTION AND MIMICRY OF APATELA.

By A. RADCLIFFE GROTE, A. M.

The majority of the species of *Apatela* occur in North America, where their range is extraordinarily extended, since they are found from Hudson's Bay territory in the north to the tropical regions in Mexico; they appear to be absent from the West Indies. From North America, north of Mexico, sixty species are described, the European fauna has a total of fifteen (consult Grote, Die Verwandtschaft zwischen der Noctinden-Fauna von Nordamerika und Europa, Gerhandl. Gesell. Deutsch. Naturf. und Aerzte, Bremen, 1890). A surprising number of species have been collected in Bastrop Co., Texas, by Belfrage; from this State twelve species are recorded. From California only four species are certainly known, *perdita*, *spinea*, *lupini*, *felina*; the last is, according to Dr. Dyar, an *Acronycta*, the second and third I have referred to a distinct subgenus, *Merolonche*, but, after seeing the European *menyanthidis*, it appears possible to me that *spinea* is congeneric or, at least, related. The bulk of the species are found over the temperate regions of the South American Continent, from Lower Canada to the Gulf; from New

England to Colorado. According to the classification of the larvæ, five subgroups are common to Europe and North America. Strictly "representative" species, true species of replacement, seem to be only *alni* and *funeralis*, *euphorbiæ* and *sperata*, *auricoma* and *impressa*, *leporina* and *vulpina*, while, although the moths are very near, the larvæ of *psi* (or *tridens*) differ rather decidedly from *occidentalis*, so that *psi tridens* and *occidentalis* appear rather as parallel species. The species referred to *Hybona* and *Triæna* are very numerous in North America, the larvæ being more or less easily distinguishable, while the moths differ chiefly in their relative proportions, the *psi* pattern being repeated in *morula*, *occidentalis*, *hasta*, *furcifera*, *betulæ*, *grisea*, *tritona*, *quadrata*, *lobeliæ*, *radcliffei*. Peculiarly European groups are offered by those named by me *Apatela*, *Cuspidia*, peculiarly American are *Megacronycta*, *Philorgyia*, *Tricholonche* and *Lepitoreuma*. Taking all the groups in the synopsis as distinct, we have eight American, three European and five common to both faunæ, from larval characters alone.

Although in North America the genus *Apatela* offers peculiar outgrowths, so to speak, its affinity with the European is decided. We may therefore regard it as one of the survivors of a former holoarctic or circumpolar fauna, which would have been forced southwards, both in America and Asia, by the advent of the Glacial epoch. Traces of this European affinity are found in the moths of Japan, and has then the same origin. To the same shifting of the faunal extension, the sundering of species once occupying an extended territory, through climatological changes, we must ascribe the fact that the genus *Oreta* is found in Japan and North America. If my suspicion that the California *spinea* and the European *menyanthidis* are related is verified, it would be another link in the chain of facts which go to show that the Rocky barriers. There is also the dependency upon food plants and geognostical conditions to be considered. At any rate, the central California fauna must be studied from the point of view that it is isolated upon a comparatively narrow strip of land as compared with the fauna east of the main range. And this view must be taken of the fauna of the West Coast, both in North and South America, wedged in as it is between the sea and the mountainous backbone of the New World.

The very near relation between the moths of *psi*, *tridens* and *occidentalis*, while the larvæ are so strikingly different, recalls the case of *Datana* and *Phalera*, though here the larval characters are decidedly stronger and even structural. We may assume that here the tendency to split into distinct larval forms was early developed, and that it exemplifies the fact that specific characters in *Apatela* are best, perhaps first, expressed in the younger stages. The two European species seem altogether nearer, and lead to the impression that they have a more immediate connection, while the American probably left the common ancestor at the close of the Tertiary.

In 1894, Dr. Harrison G. Dyar discussed the appearance of the larvæ of *Apatela*, and his remarks are in part applicable to the European forms. The diversity is mainly ascribed to a "mimicry of all sorts of objects, from that of resemblance to the foliage (*grisea*, *tritona*), to warning colors (*oblinita*) and mimicry of special objects, such as spider's nest (*vulpina*) or of some other specially defended larva (*radcliffei* mimics *Datana*, or *luteicoma*, which probably mimics *Orgyia*)." Previously, in 1893, Dr. Chapman had discussed the mimicry of the larvæ as follows: "The protection which the full grown larvæ have from their enemies, owing to their special form and coloring, is a matter that in its details, has very largely eluded me; I have, in fact, seen very few *Cuspidia* in the wild state. *Psi* and *tridens* are usually conspicuous; *strigosa* no doubt closely assimilates to a hawthorn leaf with a bit of brown dead leaf or twig. My observations on *leporina* were made and repeated a good many times on the green white-haired form occurring on alder; this larva sits somewhat curled round, near the middle of the underside of a leaf. Looking down from above it is absolutely hidden, looking up from beneath it ought to be very evident, but this is far from being the case. I have several times missed a larva till I have looked three or four times, and have also fancied I saw a larva when none was there. In looking up from below through the foliage of an alder tree, most of the lower leaves are in the shade of the upper ones, but here and there a gleam of light falls through on to a portion of a leaf, and gives it quite a different tone and appearance, as seen from beneath. A larva of *leporina* seated beneath an unilluminated leaf, precisely resembles one of these patches." It is the American representative of *leporina*, my *vulpina*, which Dyar fancies bears, in its position on the leaf, a resemblance to a spider's web. I have at one time fancied that the larva of *alni* and *funaralis*, had deterrent colors, but conclude that it is a case of mimicry. The black body resembles a wet twig, the creamy dorsal patches mould, while the spatulate hairs are like the filaments of club mosses. The somewhat slow and stealthy movement which I have noticed in this to me repulsive larva, adds to the deceptive likeness to these inanimate objects so common in the woods. The young larva of *alni*, resting in a curled position on the leaf above, seems to imitate in its colors bird excrement.

With regard to the mimicry of caterpillars we must remember that larvæ are exposed to the attacks both of vertebrates and invertebrates. Birds prey upon them, and they have every reason to fear the attacks of insect parasites. The law of vision may thus be assumed to be the same for the vertebrate as for the insect eye. Both the bird and the wasp must be deceived by the appearance of *alni* and of *funeralis*, and pass them over, if the mimicry is to be effective. It may be argued, from the unity in the manifestation of mimicry, no general indications being apparently offered, of mimicry working in two directions to meet different visual conditions in its enemies, that it succeeds both with the bird and the wasp in a percentage of instances. The original percentage, like the original variation was small, but sufficient to establish the original direction, and, once established, it is evidently worked out by heredity to the condition in which we now find it. To be effective with the wasp, as with the bird, the mimicry of *alni* must produce a similar effect upon the retina of both; in this case not only the form, but the color, must be seen, both together suggesting to the brain of bird and insect not the real, but a different, and, to them, indifferent object. The immunity is probably only the result of cursory examination, but even this is sufficient to justify the variation. So far as the larval groups in *Apatela* are established, they partly show a special direction in the means to secure immunity from their enemies. Thus the more typical forms of the subgenus *Hyboma* resemble foliage, while several species belonging to the genus *Pharetra* seem deterrent. The general neutral gray tint of the moths has been commented upon by authors as adapted to conceal them from observation in their usual resting places, in the crevices of the bark and against the trunks of trees. The moths which choose such resting places in the daytime have generally gray or blackish, protectively colored primaries, of such neutral tints as to deceive the eye in passing rapidly over an extended surface. But in *Apatela* the direction of the mimicry, the object copied, differs in the larva and moth of the same species. The independent direction of the larval efforts in this respect is important evidence in sustaining the view that in metamorphosis the stages acquire characters useless to the succeeding, and that here the larva of *Apatela* has attained an independent perfection as regards ultimate peculiarities of adaptive structure applicable only to the conditions of its own particular stage.

◆

CORRECTION OF THE TYPE OF AGRONOMA AND NOTE ON LASPEYRIA.

By A. RADCLIFFE GROTE, A. M.

It has been recently stated by Mr. John B. Smith that the type of *Agronoma*, given by me in the Bremen List, May, 1895, p. 23, viz: *vestigialis*, does not correspond in structure with *jaculifera*, the type of *Feltia*, inasmuch as the front is not roughened or tuberculate and the front pair of tibiæ are not heavily armed. Still my reference of *Feltia* to *Agronoma* will hold. The material examined by me in Bremen in 1893–4, when writing the list, is no longer accessible to me and I am not sure what species I examined. But Hübner's genus *Agronoma* contains, beside *vestigialis*, both *crassa* and *exclamationis*. I have examined here, in the Roemer Museum, specimen of *crassa*. The fore tibiæ are heavily armed, the front is roughened or tuberculate, the male antennæ are pectinate. It is therefore a *Feltia*. Inasmuch as *vestigialis* is referred as belonging to *Agrotis* in a restricted sense, and as congeneric with the type *segetum*, as established by me and adopted by me in the "Revision," it follows that the type of *Agronoma* must be changed and *crassa*, the first species cited, is then the type. Hübner establishes *Agronoma* for species having the general aspect of *jaculifera;* the claviform is usually suffused with a darker color. Probably the European species *exclamationis*, *corticea*, *obesa*, *graslini* and *fatidica* belong to *Agronoma* and share the structure of *crassa*. The name of our common North American species will then remain, as claimed by me in the list: *Agrotis* (*Agronoma*) *jaculifera* Gn. Those using my Bremen List will please make the correction and I am much obliged to Mr. Smith for this opportunity of showing its necessity. As soon as possible I hope to bring the European and American species into more complete accord. Up to the present I have had insufficient material and opportunity.

I have lately had the opportunity of examining the Sectio I of Germar's Prodromus, 1811. In this the author establishes the genus *Laspeyria* for *flexula*. Duponchel's genus *Aventia*, 1841, has been in general use for this species, but it must apparently now yield to Germar's earlier term. We would now have the species of Schrank's genus *Drepana* finally properly referred. To me, at least, this is a matter of satisfaction, as I have occupied myself with the group at various intervals since 1862. Of these genera *Cilix*, *Platypteryx* and *Laspeyria* are confined to Europe, *Drepana* and *Falcaria* are common to Europe and North America, *Oreta* to Eastern Asia and North America. *Laspeyria* must be removed from the family Platypterygidæ and referred to the Agrotidæ, subfamily Hypeninæ.

◆

NOTE ON ENÆMIA CRASSINERVELLA *Zell* (MIEZA IGNINIX *Walk.*).

By Annie Trumbull Slosson.

Walking one day in February along the shore at Punta Gorda, Florida, I saw a small larva upon my sleeve. It seemed to have spun down by a thread, and, looking up, I saw many similar larvæ suspended from leaves and branches of a shrub. This shrub was one quite common along the west coast. It has sharp and stout thorns and small, rather coriaceous leaves of dark green. I have never seen it in flower or fruit, and do not know its name.

I carried home some of the larvæ with the food plant. From their general appearance I thought them Limacodids. They fed well in confinement, throve and grew. At the end of a week or two, as I was leaving Punta Gorda, and feared I might not be able to procure proper food on the east coast, I liberated many of my captives, and, believing in the survival of the fittest, retained only the largest and healthiest. The limited supply of food proved sufficient, and I brought several larvæ to maturity. Soon after I reached Palm Beach these spun curious little cocoons, very Limacodid-like in appearance, and of the same tough parchment texture. In the meantime I had sent to Dr. H. G. Dyar some of the larvæ for examination and identification. He wrote me that they were evidently highly specialized Tineids and of much interest, and expressed his hope that I would raise the moth. In a little less than four weeks from the time the cocoons were made the moths appeared. I at once recognized them as *Mieza igninix* Walk., the *Enæmia crassinervella* of Smith's check-list. This dainty little creature, with primaries of silvery white, striped and dotted with black and secondaries of vivid rose color, is not uncommon at Punta Gorda, and I had taken it several times this season resting on leaves near the spot where I found the larvæ. Dr. Dyar will publish a full description of the larva, with notes.

A DESCRIPTION OF THE LARVA FOUND BY MRS. SLOSSON.

BY HARRISON G. DYAR, PH. D.

Considerable interest attaches to Mrs. Slosson's discovery of the larva of *Enæmia crassinervella*, since in it we find an exposed feeding Tineid. These are always of interest, for as soon as the Tineids abandon their concealed mode of life numerous specializations occur, and usually in the direction of some higher family of the group—the superfamily Tineides. I was able recently to describe a Tineid (*Butalis basilaris* Zell), which had assumed many characters of the Pterophoridæ, and now I shall describe the present species with strong tendencies toward the Eucleidæ, yet without losing its essential Tineid characters.

Larva.—Flattened, thick, head partially retractile, but large, joint 12 slightly enlarged dorsally; shape of Harrisina, but more flexible, suggesting the Eucleidæ by the soft, subventral region; feet very soft, short, of the normal number. Setæ single, except a few irregularly distributed secondary setæ, or rather reduplications cf the primary ones, short, stiff, glandular tipped. Setæ i and ii approximate, in line transversely, a secondary seta adjacent to i or ii or both, irregular in position. Seta iii single; iv and v approximate, yet by no means consolidated; iv a little above v, with or without a secondary seta below and behind it; vi double; two setae on the leg. Joints 3 and 4 with both primary and sub-primary setæ, a secondary seta near i a and i b and near ii a and ii b on joint 4, but variable. Seta iii seems absent on joint 4, though present on 3. Cervical shield large, black, with six setæ, normal. Spiracles large, circular, Eucleid-like, a soft, eversible, colorless space above tubercle vi on the segments with feet.

Head black, the sutures pale; labrum white. Body with the dorsum broadly black, containing a narrow white dorsal line, a broader pale orange addorsal line, darker orange at the slightly elevated tubercles i and ii, especially on joints 3, 12 and 13; a narrow white subdorsal line. Lateral region colorless; a broad white lateral line above tubercle iii, edging the black dorsum; a narrow white stigmatal and a subventral line. Spiracles yellowish; setæ pale. Anal plate whitish, slightly marked with black. Skin finely transparent granular, the markings appearing as if below the surface, as is so common in the Eucleidæ. Hooks of the abdominal feet in a half circle on the inner side of the planta. Length of the larva 8 to 9 mm. Width of head about 1.3 mm.

Cocoon.—Rounded, flattened on two sides by the leaves between which it was spun, of a firm hard texture like the cocoon of the Eucleidæ and of the same dark brown color. There is, however, no lid for the emergence of the moth, but the pupa forced a crack along one side where the cocoon was angulated by the leaf and emerged entirely on the escape of the moth. The pupa is simply a soft transparent yellowish skin without cremaster, possessing the usual Tineid characters.

NEW CALIFORNIAN SPIDERS.

BY NATHAN BANKS.

Most of the following new species of spiders were contained in a collection sent me for determination by Prof. V. L. Kellogg, of Leland Stanford Junior University.

THERAPHOSIDÆ.

Atypoides californica, sp. nov.

Length ceph. 5.5 mm., breadth, 4 mm.; abdomen long 6 mm. The cephalothorax is pale, head fusco-olivaceous, mandibles still darker, legs and sternum pale, abdomen brownish, venter lighter. Eyes similar to *A. riversi*, but the cephalothorax plainly broader than in that species; the groove simply a round impression, not elongate; legs shorter and more spiny than in *A. riversi*, there being a few spines on anterior tarsi, smooth spaces above on the patellæ; second joint of palpi almost as long as the anterior femora; six spinnerets, the small pair thicker than in *A. riversi*, superior pair shorter than in that species, the last joint not longer than the penultimate, and conical in shape.

Black Mt., Calif., Oct. 23, trap-door alongside of creek. Mr. R. W. Doane, collector.

DRASSIDÆ.

Pœcilochroa pacifica, sp. nov.

Length 7 mm. Cephalothorax and legs reddish, latter darker toward tips; mandibles red brown; sternum reddish; abdomen black, with a broad white stripe on each side above, reaching from base to beyond middle, connected at middle; some indistinct pale chevrons above the black spinnerets; venter black, with a large basal area pale. Much resembling, at first sight, *P. variegata*, but different pattern on abdomen, and pale anterior legs and mandibles; the dorsal groove longer and more distinct; the posterior row of eyes straight, or barely recurved, the P. M. E. more than once their diameter apart; the sternum broader. The epigynum shows a nearly circular dark area, with a narrow transverse cavity in its posterior part.

Univ. Campus; Nov. [R. W. Doane].

AGALENIDÆ.

Agalena pacifica, sp. nov.

Length 8-12 mm. Cephalothorax pale yellowish, seam black, a straight black stripe each side; mandibles rather reddish; sternum reddish or yellowish; legs yellowish, often with rather indistinct dark bands; abdomen pale, with a black stripe each side above, a curved line partly around the spinnerets, and a line on each side of venter, black; epigynum reddish. P. M. E. about their diameter apart, farther from the P. S. E.; A. M. E. hardly one-half their diameter apart, and as close to the A. S. E.; last joint of the superior spinnerets no longer than the penultimate. The epigynum consists of a large rounded cavity, broader than long, opening behind into a cavity that extends to the transverse groove. The male palpi are black, the tibia much longer than broad, rather curved on the outer side, and has at base a double projection, each branch with a rounded tip, and at its tip, on the under side, a short straight projection; the tarsus is not prolonged much beyond the bulb, there is a short curved tube at tip of bulb, a curved plate on inner side toward base, and some short pieces near the center.

Palo Alto and Black Mt.; Oct. and Nov. [R. W. Doane.].

Agalena californica, sp. nov.

Length 7-10 mm. Cephalothorax pale yellow, with a black seam, and a straight black stripe each side; mandibles more reddish; sternum pale in middle, always dark on sides; legs pale, darker toward tip, and with many black bands; abdomen thickly spotted with black, forming a stripe each side, two curved pale marks at base, followed by pale spots; venter with a black line each side, and black spots on middle. Eyes similar to *A. pacifica*; apical joint of superior spinnerets nearly twice as long as penultimate; epigynum shows a cavity much broader than long, and the anterior margin at middle projecting backward. The tibia of the male palpus is about as long as broad, with a concave hard piece on the outer side, the basal ridge of which is rather prominent; at the tip on the under side is a curved projection; on the inner side of bulb is a long pointed piece, and near the tip is a short, stout tube.

Palo Alto and Black Mt., Oct. and Nov. [R. W. Doane].

Tegenaria californica, sp. nov.

Length 3.5 to 4 mm. Cephalothorax pale, with a black margin, dark spots on the radial furrows, a larger one over the dorsal groove, which gives off branches, the narrower pair curve to the P. S. E., the broader pair extend to the P. M. E.; eyes on black spots; mandibles testaceous, sternum blackish; abdomen black, with white spots, mostly near base, and some narrow chevrons near tip; venter spotted, the spinnerets black; legs pale, four marks on underside of femora, one on patellæ, three on tibiæ, two or three on metatarsi. Cephalothorax low, moderately broad; anterior row of eyes straight, A. M. E. smaller than others, hardly one-half their diameter apart, posterior row procurved, the P. M. E. fully their diameter apart, and as far from the equal P. S. E.; sternum broad, pointed between hind coxæ, sides rounded; legs long, with scattered slender spines and hairs; abdomen nearly twice as long as broad, pointed behind. The epigynum shows two oblong dark marks, reddish and separated at base, black and united at tip. The tibia of the male palpus has a furrow at base, with a ridge each side, and a small projection at tip; tarsus very large, almost globose, with a slender tip, half as long as the main part, the bulb is circular, not much convex, with a stout, short, curved tube from centre, and a hyaline sheath.

Black Mt. and Univ. Campus; under boards, etc., Nov. [R. W. Doane].

Epeiridæ.

Epeira excelsa, sp. nov.

Length ♀ 7 mm.; abdomen 5 mm. wide at base. Cephalothorax and legs pale yellow or brownish-yellow, usually without markings except bands at tips of metatarsi and hind tibiæ; sternum brown; abdomen brown or yellowish, a pale yellow band connecting the two basal humps, beyond sometimes with two blackish spots; venter dark in middle, with an indistinct yellowish mark each side. A. M. E. twice their diameter apart, P. M. E., fully once their diameter apart, scarcely larger than the on edge and margined with silvery; sides finely striped with black; venter with a broad black stripe, narrowed toward tip, then widened to surround the dark spinnerets. A. M. E. more than their diameter apart, P. M. E. about their diameter apart, much farther from the S. E.; first pair of legs much the longest, three spines above on femur IV; abdomen elliptical; the epigynum shows a dark transverse area, three times as wide as long, and behind with a small projection from the middle.

Palo Alto, Calif.; Oct. and Nov. [R. W. Doane]; also Olympia, Wash.

Misumena californica, sp. nov.

Length 7 mm. Cephalothorax brownish, with a broad white middle stripe; mandibles white, brownish at base; sternum and legs pale yellowish; abdomen rather dirty whitish, with indistinct veinings and some black dots near center; venter pale, sometimes with a few black spots in middle. Cephalothorax as broad as long, equal to tibia I; P. M. E. a trifle further apart, but no larger than A. M. E.; legs thickly clothed with stiff bristles, four or five pairs of spines under tibia I, six or seven under metatarsus I; sternum not broad; abdomen broadest behind middle, quite high, pointed at tip; the epigynum shows a semi-circular cavity, divided by a narrow septum, and two holes behind.

Los Angeles, California, [A. Davidson].

Misumena pictilis, sp. nov.

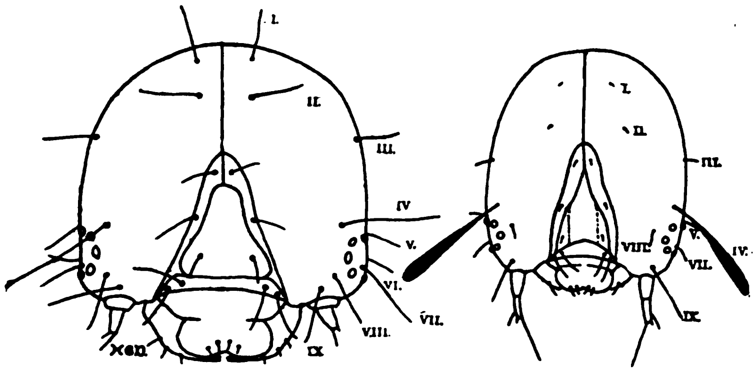
Length 5 mm. Cephalothorax greenish yellow, black on anterior side margin, three black dots on each side in a straight row behind the P. S. E., eyes on white spots; mandibles greenish, each with a black point; legs greenish yellow, with some scattered black dots on the anterior pairs; sternum yellowish; abdomen greenish white, with a large reddish brown spot above, narrower in front, pointed behind, outlined by black dots and some others scattered in it, two large white spots near base and a series of double white spots behind; venter pale. Cephalothorax as broad as long, shorter than tibia I; P. M. E. barely further apart, and hardly larger than A. M. E.; legs slender, spines long, four pairs under tibia I, five or six under metatarsus I; sternum shield shaped; abdomen broadest behind the middle; the epigynum shows a rounded cavity, broader than long, divided by a rather broad septum, which is widened near the middle.

Palo Alto, California. [Stanford University Coll.].

NOTE ON THE HEAD SETÆ OF LEPIDOPTEROUS LARVÆ, WITH SPECIAL REFERENCE TO THE APPENDAGES OF PEROPHORA MELSHEIMERII.

By HARRISON G. DYAR, PH. D.

The peculiar flattened antenna-like organs on the head of *Cicinnus melsheimerii* have long been known. Harris says: "On each side, just behind the five ocelli, are two flexible, slender, spathulate antennæ (?) which, however, seem to be without joints and incapable of motion." Again he says: "On each side of the middle of the head there is a black flexible kind of antenna, very slender where it joins the head and broader toward the end like the handle of a spoon." Dr. Packard remarks: "This larva is especially remarkable for new structures not known to exist in any other caterpillars, viz., a pair of long appendages, the use of which is quite unknown. They arise by a slender stalk behind and a little above the eyes, on each side of the head; the base is cylindrical, but the appendage soon becomes flattened or compressed and flattened bulbous at the end. The structures are brittle, not flexible, and they easily break off." From the foregoing it would appear that the homology of these structures has not been recognized, although it is a very simple one. The structure is an enlarged and flattened seta, exactly analogous to those on the body of *Apatela funeralis* and a few other larvæ. That one of the head setæ should assume this form is perhaps unique, but no more surprising than that some of the body setæ should do so. As to its function we are ignorant, as is also the case in



within the circle of the eyes above and behind the second ocellus, viii is before the second ocellus, and ix is above the base of the antenna. The clypeal setæ are shown, but not numbered. Figure 2 represents *C. melsheimerii.* It is evident at a glance that the spathulate seta or antenna-like appendage is the fourth epicranial seta. The head of *C. melsheimerii* is coarsely roughened with broad rounded pits. All the upper setæ (namely i and ii on epicranium and the three upper clypeal setæ) are greatly reduced, only tiny rudiments remaining. Seta iii is small but distinct, iv is enormously enlarged and flattened, situated above and behind the fourth ocellus. All the lower setæ are normally developed.

Cicinnus belongs to the *Microlepidoptera* (Tineides), and the exact position of its head setæ is in many respects more directly comparable with other Tineides. For example in *Plutella porrectella,* seta viii is situated before the fourth ocellus as in *Cicinnus* and not low down near seta ix as in the Noctuidous larva shown. However, I have preferred to figure the Noctuidous larva, as the comparison is thus given a wider scope.

◆

DESIDERATA OF NORTH AMERICAN NOTODONTIDÆ.

BY A. S. PACKARD.

The following gaps or desiderata occur in our knowledge of the larvæ or the life-history of the North American Notodontidæ, and attention is drawn to them here in order that collectors and students may aid us in filling them up. It is particularly requested that the desired eggs and larvæ may be sent to the author in order that colored drawings may be made of them for future publication in Part II. of the author's monograph of the Bombycine Moths of North America.

Three genera are still unknown, either in the egg, larval or pupal stage; these are *Ellida, Euhyparpax and Nystalea.*

Eggs and larva in all stages of
Gluphisia wrightii.
rupta.
albofascia.
formosa
lintneri.
Apatelodes angelica.
Datana californica.
floridana.
modesta.
Eggs and early larval stages of
Ichthyura apicalis.
inornata.
strigosa.
brucei.
Lophodonta basitriens.
Eggs and larva in all stages of
Drymonia georgica.
Lophopteryx elegans.
camelina.
Eggs and stages I and II of
Notodonta stragula.
Eggs and all the larval stages of
Notodonta simplaria.
Eilida caniplaga.
Dasylophia thyatiroides.

Eggs and larva of the two forms of
Symmerista albifrons.
Eggs and larva of
Symmerista packardii.
Eggs of **Hyparpax aurora.**
Eggs and all the larval stages of
Hyparpax perophoroides.
Hyparpax venus.
Euhyparpax rosea.
Eggs and larva in all stages of
Schizura apicalis.
Schizura perangulata.
Eggs and stages I, II, III, of
Seirodonta bilineata.
Heterocampa manteo.
Heterocampa astarte.
Eggs and all the larval stages of
Heterocampa chapmani.
Heterocampa plumosa.
Heterocampa hydromeli.
Heterocampa belfragei.
Heterocampa subrotata.
Cerura occidentalis.
Cerura occidentalis.
Cerura scolopendrina.
Nystalea indiana.

The pupa of each or any of these is desired, either alive, or in alcohol, or the cast shells. Eggs and larvæ of the following are also desired: *Platysamia ceanothi, gloveri, columbia; Hemileuca maia; juno, grotei,* and *yavapai,* (*Euleucophæus*) *tricolor, pamina; Coloradia pandora; Limacodes biguttata, rectilinea, y-inversa. Semyra beutenmulleri, Adoneta leucosigma* and *pygmæa, Heterogenea cæsonia, Tortricidia flavula, minuta* and *fasciola. Gloveria arizonensis Tolype velleda* and *laricis, Artace punctistriga.* A. S. Packard, Providence, R. I. Address during July and August, Merepoint, Cumberland Co., Maine.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF OCTOBER 1, 1895.

Held at the American Museum of Natural History.

In absence of the President, Mr. Dietz was chosen chairman *pro. tem.* Eight members present.

An invitation from the Brooklyn Entomological Society to attend their meeting and view the Neumoegen collection of Lepidoptera, was received and accepted with thanks. It was moved that a standing invitation be extended to the members of the Brooklyn Society to attend any of our meetings.

Mr. Shoemaker exhibited some Lepidoptera, among which was a specimen of *Limenitis,* evidently a cross between *ursula* and *disippus.*

Mr. Joutel showed specimens of *Taxotes cylindricollis, Belamira scalaris, Leptura canadensis* var. *erythropus, Goes pulchra, G. pulverulentus, Saperda obliqua* and also *Leptura emarginata* which he found ovipositing in the branch of a white-oak tree.

Adjournment.

MEETING OF NOVEMBER 5, 1895.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Eleven members present.

The Treasurer's report was read and approved.

A communication from the Scientific Alliance stating that the expenses of the Alliance were estimated at $600, and that the share of the Society would be $30 (5 %).

It was moved and seconded that the Treasurer be authorized to pay this sum.

The Committee on By-laws reported progress.

Mr. F. Küchler was proposed for active membership by Mr. Beutenmüller.

A paper entitled "On the Probable Origin, Development, and Diffusion of North American Species of Diabrotica by F. M. Webster," was read. (See Vol. III, page 158). Mr. Zabriskie exhibited *Microcentrum laurifolium* which he caught by imitating the call, with a quill, which was so perfect as to deceive the insect.

MEETING OF NOVEMBER 19, 1895.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Eleven members present.

Mr. F. Küchler was elected an active member.

Mr. Joutel gave some notes on the life history of the species of *Saperda* and *Goes*, illustrated by specimens of beetles and their work. Also some young larvæ of *S. obliqua* at work in alder. He mentioned that nine of the 13 species were found in New York City.

Mr. Beutenmüller and Schaeffer exhibited *S. cretata* and *S. moesta* from the west.

Rev. Zabriskie mentioned digging a *S. vestita* from apple, and read an article on the English way of setting butterflies.

Rev. Zabriskie also read a paper on the egg cones of *Chrysochus auratus* illustrated by beetles and cones.

Adjourment.

MEETING OF DECEMBER 3, 1895.

Held at the American Museum of Natural History.

President Rev. J. L. Zabriskie in the chair. Ten members present.

Mr. Ditmars read a paper entitled "Collecting at Delaware Water Gap."

Mr. Beutenmüller showed *Papilio homerus* from Jamaica and a pair of *Eudæmonia argus* from Africa which he said were worth £15.

Dr. Prime spoke on the book worm and mentioned that the head was so hard it was impossible to crush it with a knife blade. They seem to prefer old books.

Rev. Zabriskie showed the leaves of Hazel rolled into a ball by the weevil, *Attelabus rhois*. He said it was always the fourth leaf from the

Mr. Dyar showed a rather rare series of plates colored by hand on the Bombycidæ. Mr. Joutel had examples of *Hexarthrum ulkei* and its ravages in a pine board. Also larvae.

MEETING OF JANUARY 7, 1896.

Held at the American Museum of Natural History.

In the absence of the President, Dr. R. Ottolengui was elected temporary chairman. Eight members present.

Treasurer report was read and accepted.

The following members were dropped from the roll: Mohns, Rix and Rosevelt. Mr. Charles Upson Clark was elected as corresponding member.

Mr. Herman Hug was proposed as active member by Dr. Kudlich.

The nominations for the year were:

President, Rev. J. L. Zabriskie; Vice-President, Charles Palm; Recording Secretary, Louis H. Joutel; Corresponding Secretary, R. L. Ditmars; Treasurer, C. F. Groth.

Executive Committee: Messrs. J. L. Zabriskie, E. G. Love, Dietz, H. G. Dyar, C. F. Groth.

Publication Committee: E. Daecke, C. Schaeffer, L. H. Joutel, Wm. Beutenmüller.

Field Committee: L. T. Munch, Julius Meitzen.

On motion the Recording Secretary was directed to cast an affirmative ballot for these candidates, after which the officers were declared elected.

MEETING OF JANUARY 21, 1896.

Held at the American Museum of Natural History.

President Rev. J. L. Zabriskie in the chair. Fourteen members present, also Profs. Putnam and Sirrine.

Mr. Beutenmüller read a paper entitled "The Sesiidæ inhabiting America, North of Mexico.*

Prof. Putnam gave a short account of the life history of the bumble bees.

Dr. Ottolengui exhibited 25 rare Lepidoptera, a number of which had not been named.

Adjournment.

---

* Will be published in Bull. Am. Mus. Nat. Hist. Vol. VIII, 1896.

MEETING OF FEBRUARY 4, 1896.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Ten members present.

Mr. Beutenmüller gave some notes on *Catocala.* He stated that *C. californica* had been made a variety of Walker's *C. electilis,* but that *californica* was a good species and *electilis* a Mexican species allied to *junctura.* He further stated that *C. cassandra* was the same as *electilis,* a figure of which was published by Mr. Druce in Biologia Centrali-Americana Het. Vol. I, pl. xxxi, Pg. 8.

After discussion, adjournment.

MEETING OF FEBRUARY 18, 1896.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Eleven members present.

A paper by Mr. A. P. Morse "On the stridulating Organs of Orthoptera" was read (see ante p. 16).

Mr. Dyar gave some notes on Head Setæ of Lepidopterous Larvæ. He stated that the setæ did not show much variation in position in the different larvæ he had examined. In regard to the flattened appendages of *Perophora melsheimeri* he said that they were called antennæ by Harris, who afterwards modified his statement. Mr. Dyar, by aid of diagrams showed that they were flattened hairs and originated from the setæ and corresponded to the hairs of other larvæ in position. He also showed a larvæ of *Apatela funeralis* which, in the last stage has all its hairs flattened.

Dr. Seifert exhibited a work on the European hybrid Lepidoptera, illustrated by many colored plates.

Adjournment.

MEETING OF MARCH 3, 1896.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Twelve members present.

A communication from the New York Microscopical Society extending an invitation to participate in their annual exhibition was received and accepted with thanks.

Mr. Schaeffer read a paper on the Coleopterous genus *Nodonota,* in which he gave the characters by means of which the species could be separated from other allied genera. He also spoke about the species occurring in the vicinity of New York, illustrated by a series of specimens.

Mr. Joutel exhibited specimens of Hickory, showing the borings made by the hickory borer (*Cyllene pictus*).

After discussion, adjournment.

JOURNAL

OF THE

New York Entomological Society.

Vol. IV. SEPTEMBER, 1896. No. 3.

THE NORTH AMERICAN SPECIES OF NEMOBIUS.

By Samuel H. Scudder.

The North American species of the Orthopteran genus *Nemobius* Serville are more numerous than has been supposed, notwithstanding that several species have been more than once described as distinct. Prof. L. Bruner, of Lincoln, Neb., has kindly sent me a considerable series from his collection; Mr. A. P. Morse, of Wellesley, Mass., has placed his collection, mainly from New England, in my hands; the collections of the Museum of Comparative Zoölogy and of Mr. S. Henshaw have been at hand; and these, with a few specimens from the National Museum, added to my own, form the basis of the following table and descriptions. Although Trinidad belongs zoölogically to South America, I have added one species found there. The number of known species is hereby doubled, and doubtless more await discovery.

I should add that "*Nemobius circumcinctus*" Scudd. (Proc. Bost. Soc. Nat. Hist., XII, 143) from Mexico is a *Prothacustes* and identical with the later described *P. mexicana* Sauss.; the species given by Provancher (Faune Ent. Can., II, 24) as "*Nemobius* (*Anaxipha*) *septentrionalis* Scudd." was named for him by me as *Anaxipha septentrionalis*, but it is identical with *Anaxipha exigua* (Say); it was formerly (Nat. Canad., VIII, 61) called by him *Nemobius exiguus*, as Say's species; an insect referred to as "*Nemobius marginata*" by Miss Murtfeldt (Ins. Life, V, 155) is probably an accidental error, as no such name has been given; "*Nemobius? pulicarius*" Walk. (Cat. Derm. Salt. Brit. Mus., I, 111), is an *Anaxipha*. This covers all the North American species referred to *Nemobius*, except those given below in the synonymy.

I have followed Saussure in employing the female alone (or almost alone) in constructing the following table, since the males of several of the species are unknown to me. Only the more important synonymy is given.

Table to determine the N. A. species of Nemobius.

A¹. Ovipositor as long as or barely shorter than the hind femora, generally rigidly straight.

  b¹. Tip of ovipositor unarmed; last joint of maxillary palpi very obliquely excised at apex.

    c¹ Tegmina short; wings wanting; last joint of maxillary palpi bicolored, the oblique apical excision of lower margin beginning before the middle.. **distinguendus.**

    c². Tegmina long; wings very long; last joint of maxillary palpi unicolored, the oblique apical excision of lower margin beginning beyond the middle .... **ensifer.**

  b². Tip of ovipositor serrate or dentate; last joint of maxillary palpi almost transversely excised at apex.

    c¹. Ovipositor distinctly (at least a tenth) longer than hind femora.

      d¹. Blackish; dark and light colors of tegmina of ♀ feebly contrasted longitudinally above (Northern)....................... **fasciatus.**

      d². Grayish; dark and light colors of tegmina of ♀ strongly contrasted longitudinally above as on sides (Southern).... .... **canus.**

    c². Ovipositor barely as long as, or slightly shorter than, hind femora.

      d¹. Teeth of ovipositor blunt, little elevated; wings generally very long .... **socius.**

      d². Teeth of ovipositor sharp, well elevated, well separated; wings wanting.

        e¹. Tegmina of ♀ nearly or quite twice as long as pronotum; of ♂ strongly rounded apically, feebly margined with pallid at sides of dorsal field only, if at all..................... **utahensis.**

        e². Tegmina of ♀ scarcely longer than pronotum; of ♂ broadly rounded apically, with the dorsal field distinctly margined with pallid throughout except at base................ **ambitiosus.**

b². Tegmina of ♀ much shorter than the abdomen; wings wanting.
  c¹. Ovipositor barely arcuate.
    d¹. Tegmina of ♀ no longer than head and pronotum combined. **mormonius.**
    d². Tegmina of ♀ distinctly longer than head and pronotum combined.
      e¹. Longitudinal markings of head continuous to extreme back of same; ovipositor with distinct and well separated teeth at apex. **toltecus.**
      e². Longitudinal markings of head interrupted at the crown, the whole back portion immaculate, sharply defined from the portions in front at the summit, which is feebly subcarinate transversely; ovipositor with fine, close, minute denticulations.... **mexicanus.**
  c². Ovipositor distinctly though but feebly arcuate............ **carolinus.**

Nemobius distinguendus, sp. nov.

Head not very full, castaneous black, with a straight, oblique, bright luteous stripe above the eyes, passing from the antennal scrobes to the back of the head on either side; eyes not prominent; antennæ blackish fuscous; maxillary palpi pale, the last joint infuscated except at base, very obliquely excised apically, beneath, over more than the apical half. Pronotum black, feebly tinged with testaceous laterally, rather closely hirsute with rather short fulvous bristles, equal, nearly twice as broad as long. Tegmina covering two-thirds of the abdomen, apically well rounded, uniform testaceous, but with the lateral field feebly infuscated; wings aborted. Legs blackish above, dull flavous beneath like the under surface of the body. Cerci very regularly tapering to a fine point, about as long as the pronotum and tegmina combined. Ovipositor fully as long as the hind femora, straight, slender, the apical blades scarcely enlarged at the base, regularly tapering, scarcely more than twice as long as their basal breadth, wholly unarmed, the tip acute. Length of body, 10 mm.; of hind femora, 6.9 mm.; of ovipositor, 7 mm.

1 ♀. Orizaba, Mexico (L. Bruner).

Nemobius ensifer, sp. nov.

Head rather full, blackish castaneous, faintly striate with testaceous posteriorly, lutescent down the face; eyes not very large, rather full and prominent; antennæ testaceous, somewhat infuscated beyond the basal portions; maxillary palpi luteo-testaceous, the last joint very obliquely excised apically beneath for a little less than half its length. Pronotum fusco-castaneous, sparsely hirsute with black bristles of no great length, equal, about half as broad again as long. Tegmina three-fourths as long as the abdomen, the tip very strongly rounded, subacuminate, the veins blackish or fuscous, the ground fusco-castaneous, more or less clouded; wings very long. Legs dirty luteous marked above with fuscous. Ovipositor considerably longer than the hind femora, very slender, a little arcuate, the apical blades rather long, scarcely enlarged basally, subequal in basal half, tapering beyond, wholly unarmed, the tip blunt. Length of body, 10 mm.; of hind femora, 7.75 mm.; of ovipositor, 8.25 mm.

1 ♀. Central America, Rev. Th. Heyde (L. Bruner).

This species and the preceding can be confounded with none of the others from the unarmed blades of the ovipositor. The males are unknown.

Nemobius fasciatus.

Gryllus fasciatus DE GEER! Mém. III, 522, pl. 43, fig. 5 (1773).

Nemobius fasciatus SCUDDER! Bost. Journ. Nat. Hist. VII, 430 (1862); GLOVER, Ill. N. A. Ent. Orth. pl. 6, fig. 13 (1872); SAUSSURE, Miss. Scient. Mex. Rech. Zool. VI, 389 (1874); STÅL! Rec. Orth. III, 1 (1875); SAUSSURE, Mel. Orth. II, 242 (1877); BEUTENMULLER, Bull. Amer. Mus. Nat. Hist. VI, 266, pl. 5, fig. 9 (1894).

Acheta hospes FABRICIUS, Syst. Ent. 281 (1775).

Acheta servilis [Say, Mss.] HARRIS! Catal. Ins. Mass. 56 (1835).

Acheta (*Nemobius*) *vittata* HARRIS! Treat. 123 (1841).

Acheta vittata RATHVON, Rep. U. S. Dep. Agric. 1862, 380, pl. fig. 16 (1862).

Nemobius vittatus SCUDDER! Bost. Journ. Nat. Hist. VII, 430 (1862); GLOVER, Ill. N. A. Ent. Orth. pl. 3, figs. 9, 10 (1872); SAUSSURE, Miss. Scient. Mex. Rech. Zool. VI, 389 (1874); SCUDDER! Rep. Geol. N. H. I, 364, fig. 48 (1874).

Nemobius fasciatus vittatus BEUTENMULLER, Bull. Amer. Mus. Nat. Hist. VI, 267, pl. 5, fig. 10 (1894).

Nemobius exiguus SCUDDER! Bost. Journ. Nat. Hist. VII, 429 (1862).

? *Nemobius marginata* MURTFELDT, Ins. Life, V, 155 (1893).

This species is dimorphic: long-winged, with tegmina reaching commonly to the end of the abdomen (*fasciatus*); and apterous, with short tegmina (*vittatus*). To the former belongs *A. hospes* Fabr., and to the latter *A. servilis* Say and *N. exiguus* Scudd., this last not being *Acheta exigua* Say, which is an *Anaxipha*.

Both forms occur throughout the range of the insect, which is from Nova Scotia to North Carolina in the east, westward to the plains. I have seen specimens from as far north as northern New England, Montreal, Michigan, Minnesota and Manitoba, and as far west as South Dakota, Big Horn Mts. and Pine Cliffs, Wyo.; South Bend, West Point, Sydney and Lincoln, Neb.; Topeka, Shawnee and Barbour Cos., Kans. (all these western localities in Bruner's collection), as well as the Platte River, Nebr., and Iowa; and as far south as Decatur, Ala. (L. Bruner), and Virginia. It has been reported from other southern localities, which are probably correct, as Kentucky (Garman) and Mississippi (Ashmead); but of others I have some doubt, such as South Carolina, Louisiana and Texas (Scudder), East Florida (Walker) and Peru! (Bolivar), where probably other species are in question. In New England Mr. A. P. Morse has taken it on the top of Graylock, Mass., (3500′), but in the White Mountains, N. H., it occurs only in the valleys, so far as yet known.

Nemobius canus, sp. nov.

Head rather large and pretty full, beset with black bristles, gray from a mingling of dull fuscous and testaceous, above and posteriorly often separated into longitudinal stripes, the lower part of the face lutescent; eyes moderately prominent, subglobose; antennæ luteous, more or less, but nearly always slightly, infuscated; maxillary palpi luteous, the last joint infuscated, apically excised with a transverse obliquity. Pronotum subequal with slightly convex sides, generally less than half as broad again as long, sparsely beset with moderately long black bristles, luteo-testaceous, flecked more or less feebly, or suffused more or less generally with fuscous, especially mesially above and inferiorly on the sides, on the latter deepening to a fuscous stripe. Tegmina of ♂ hardly covering the abdomen, light testaceous often infumated toward base, laterally with an equal fuscous stripe next the dorsal area; of ♀ with an added fuscous longitudinal stripe on the dorsal face, outwardly, and either but little longer than half the abdomen and truncate (*brevis*), or nearly as long as the abdomen and well rounded (*amplus*); wings either wanting (*brevis*) or twice as long as the tegmina (*amplus*). Legs luteo-testaceous, the hind femora a little infuscated. Cerci fuscous, slender, scarcely longer than head and pronotum together. Ovipositor much longer than the hind femora, straight, the apical blades not enlarged at the base, regularly narrowing by the slope of the inferior margin, the tip acute, the upper edges serrate, the teeth not crowded. Length of body, ♂, 8.5 mm., ♀, 12 mm.; of hind femora, ♂, 7.5 mm., ♀, 8.6 mm.; of ovipositor, 9.5 mm.

6 ♂, 10 ♀. Dallas, Texas, (Boll); Texas, (Belfrage, Lincecum).

This species is closely allied to *N. fasciatus*, like which it appears in two forms, brachypterous and macropterous. It is possibly only a geographical race of that species, remarkable for its cinereous aspect and the striped appearance of the ♀ tegmina.

Nemobius socius.

Nemobius socius SCUDDER ! Proc. Bost. Soc. Nat. Hist. XIX, 37 (1877).

This species was described from a single female from Georgia, in which the tegmina are almost as long as the abdomen, and the wings, if present, wholly concealed. It is the only such specimen I have seen. All the others, of whichever sex, have the wings very long. Additional specimens come from Sandford (Frazer) and Charlotte Harbor, Fla. (Mrs. A. T. Slosson), from New Orleans, La. (Akhurst, Schaum), and from Texas (Lincecum, "under stones" Belfrage, Bell, Aaron) the last from the Gulf Coast.

Nemobius utahensis, sp. nov.

Head not very full, dark fuscous mottled more or less with tawny, sometimes forming longitudinal streaks; eyes not very prominent; antennæ testaceous or cinereous; maxillary palpi dull testaceous, the apical joint, excepting the basal third, blackish fuscous. Pronotum equal, much less than half as broad again as long, sparsely beset with black bristles of no great length, fuscous, with a more or less distinct, sometimes very distinct, testaceous, humeral stripe. Tegmina of ♂ shorter than the abdomen, very pale testaceous, strongly infumated at base, the lateral field with a piceous stripe; of ♀ covering a little more than half of the abdomen, very broadly rounded or subtruncate apically, testaceous with the lateral piceous stripe of the ♂ and a basal dorsal piceous spot. Legs fusco-testaceous. Ovipositor scarcely as long as the hind femora, straight or very faintly arcuate, the apical blades scarcely enlarged at the base, slender and tapering regularly to a fine point, with open serration. Length of body, ♂, 7.5 mm., ♀, 8 mm.; of hind femora, ♂, 6.6 mm., ♀, 6.25 mm.; of ovipositor 6 mm.

1 ♂, 2 ♀. Spring Lake, Utah, July (U. S. Nat. Mus.); Salt Lake Valley, Utah, Aug. 1–4; an immature ♀ was also taken at same date.

This is a smaller species than *N. fasciatus*, with relatively shorter ovipositor.

Nemobius ambitiosus.

Nemobius ambitiosus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 81 (1871).

This species is only known in brachypterous form and is probably never macropterous. It has been found only in Florida, at Ft. Reed (Comstock), Charlotte Harbor (Mrs. Slosson), Sandford (Frazer), Indian River (Priddy), and Jacksonville (Ashmead). The last two localities are derived from Bruner's collection.

Nemobius neomexicanus, sp. nov.

Head rather tumid, fuscous or fusco-castaneous, paler below; eyes rather small, not very prominent; antennæ dull luteous, maxillary palpi luteous, the last joint infuscated only at extreme tip. Pronotum tapering slightly forwards, less than half as broad again as long, sparingly beset with long black bristles, testaceous or fusco-testaceous. Tegmina of both sexes as long as the abdomen, infumated except along the sides of the dorsal surface and the costal margin, which are pallid, apically as broad again as long, more or less mottled with testaceous at the humeral angle. Tegmina as long as the abdomen, well rounded apically, fusco-fuliginous, more pallid along the union of the lateral and dorsal fields, the former in the ♀ tapering throughout; wings twice as long. Legs fusco testaceous or fuscous. Ovipositor about as long as the head and pronotum together, straight, not very slender, the apical blades a little enlarged basally, tapering regularly to a point, almost as long as the stem, bluntly, feebly and minutely serrulate. Length of body, ♂, 7.5 mm., ♀, 7 mm.; of hind femora, ♂, 6 mm., ♀, 5.5 mm.; of ovipositor, 2.6 mm.

1 ♂, 2 ♀. Trinidad (Uhler). This species must be nearly allied to *N. longipennis* Sauss., which I know only from description, but has a shorter and straighter ovipositor.

Nemobius aterrimus, sp. nov.

Head not very large, moderately full, black, more or less striped with castaneous above, posteriorly; eyes not very prominent; antennæ fusco-luteous; maxillary palpi fusco-luteous, the last joint infuscated except at base. Pronotum faintly tapering anteriorly, less than half as broad again as long, black, provided scantily with long, curved, black bistles. Tegmina black or blackish fuliginous, a little shorter than the abdomen, in the ♀ truncate apically; wings wanting. Legs dark fusco-testaceous. Ovipositor distinctly longer than head and pronotum together, but very much shorter than the hind femora, distinctly arcuate, the apical blades broadened basally, regularly tapering to a fine point, very minutely and closely serratulate. Length of body, ♂, 9 mm., ♀, 6.5 mm.; of hind femora, ♂, 6.25 mm., ♀, 5.5 mm.; of ovipositor 3 mm.

1 ♂, 1 ♀ Jacksonville, Fla.; Priddey, Ashmead (L. Bruner).

Nemobius cubensis.

Nemobius cubensis SAUSSURE, Miss. Scient. Mex. Rech. Zoöl. VI, 384 pl. 7, fig. 5 (1874); GUNDLACH, Ent. Cub. II, 367 (1891).

Nemobius volaticus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 36 (1877).

The doubtful reference by Bruner (Publ. Nebr. Acad. Sci., III, 32) to this species as coming from Nebraska is perhaps incorrect, but I do not know to what species the reference belongs.

There is some variation (at least in the United States) in the fineness of the serration of the blades of the ovipositor in this species. It is almost invariably long winged, but I have three females which are apparently apterous, though with long tegmina, one from Ogle Co., Ill. (Allen), the second from Chicago, Ill., the last from Florida. These first two localities are far north of any other known to me, excepting a single ♂ from Norway, Me. (Smith) in the Museum of Comparative Zoölogy (*possibly* wrongly labelled as to locality). Other specimens I have seen come from Georgia (Morrison), different places in Florida, such as Lake Worth and Charlotte Harbor (Mrs. Slosson), Sandford (Frazer), Capron (Comstock), and Indian River (Priddey-L. Bruner), Texas (Belfrage), Carrizo Springs, Tex. (Wadgymar-L. Bruner), Cuba

(Gundlach), San José del Cabo, Mex. (Cal. Acad. Sci., through L. Bruner) and Nicaragua (Shimek–L. Bruner). Saussure says it occurs in Cuba, Mexico and Brazil.

Nemobius mormonius, sp. nov.

Head flavo-testaceous, marked slightly with fuscous, not very full; antennæ flavous, inclining to testaceous, sometimes a little infuscated; maxillary palpi flavous, the last joint only about half as long again as the penultimate, its apical third infuscated. Pronotum flavous, much marked and blotched with fuscous, especially in the central portion of the disk and at the lower margin, equal, less than half as broad again as long, clothed sparsely with moderately long black hairs. Tegmina no longer than head and pronotum together, covering only half of the abdomen, apically truncate, black, with the veins, a humeral stripe, and both inner and costal margins pallid. Legs testaceous, more or less infuscated. Ovipositor much longer than head and pronotum together, much shorter than the hind femora, very feebly arcuate, slender, the apical blades distinctly enlarged at the base, long, tapering regularly and gently to a very fine point, delicately but not very closely serratulate. Length of body, 7 mm.; of hind femora, 4.75 mm.; of ovipositor, 3.5 mm.

2 ♀, and one nymph. St. George, Utah, April (E. Palmer).

Nemobius toltecus.

Nemobius toltecus SAUSSURE, Rev. Mag. Zool. 1859, 316; ID. Miss. Scient. Mex. Rech. Zool. VI, 386 (1874).

See the remarks under the next species.

The tegmina cover the abdomen in the ♂, but only about one-half of it in the ♀, and in both wings are wanting. Originally described from Mexico (Oaxaca is specified by Saussure in 1874), I have seen specimens only from the same country—Orizaba, Jalapa and Tepic, all through Prof. L. Bruner, the last from the collections of the California Academy of Sciences.

mint Valley, Cal. I have also seen specimens from Mexico (Sumichrast), near Mescico, Mex. (Palmer), and from Jalapa, Orizaba and Menanitlan, Mex. (L. Bruner).

Nemobius carolinus.

Nemobius carolinus SCUDDER! Proc. Bost. Soc. Nat. Hist. XIX, 36 (1877).

Cyrtoxiphus variegatus BRUNER! Publ. Nebr. Acad. Sc. III, 32 (1893).

Nemobius affinis BEUTENMULLER! Bull. Amer. Mus. Nat. Hist. VI, 249, 267, Pl. 5, fig. 11 (1894).

No macropterous form is known. There is considerable variation, apparently independent of locality, in the fineness of the denticulation of the blades of the ovipositor.

Specimens before me come from Jackman, Me. (Harvey—A. P. Morse), Norway, Me. (Smith—Mus. Comp. Zool.), Blue Hill, Milton, Mass. Sept. (S. Henshaw), Adams, Mass. (Morse), South Kent and Canaan, Conn., (Morse), New York (Beutenmuller), Ithaca, N. Y. (Morse), Orange, N. J., (Beutenmuller), Maryland (Uhler), Vigo Co., Ind. (Blatchley), District of Columbia and Virginia (Bruner), North Carolina (Morrison, Henshaw), Lake Worth, Fla. (Mrs. Slosson), Lake Okeechobee, Fla. Palmer), New Orleans, La , (Shufeldt—U. S. Nat. Mus.), Texas (Boll), Texas "Flying to light" (Belfrage), Lincoln, West Point and South Bend, Nebr. (Bruner).

◆

IMPRESSIONS RECEIVED FROM A STUDY OF OUR NORTH AMERICAN RHOPALOCERA.

By HENRY SKINNER, M. D.

I wish to speak of specific values—a subject which has always agitated the scientific mind, and perhaps always will in the future. My excuse for writing on such a subject is the fact that I believe the proper kind of studies will enable us to approximate an absolute specific value, or at least get much nearer the truth than is now shown by a study of our catalogues and lists of species. I do not care to go into the trite subject as to what is a species, but think it only fair to give my own view, or that which I should follow in the rearrangement of our species. I look upon the species as the unit of classification, and therefore it is all important to have the basis of classification as scientifically accurate as possible. I would divide the definition of species into two heads:

First, the morphological, or groups of individuals more or less alike in appearance, form, structure or color; second, the physiological, or those forms of life capable of producing fertile offspring among themselves. A species based on the morphological part of our definition I hold to be purely tentative (as we must apply the physiological part of the definition before we can be absolutely sure we have a valid species, but unfortunately it is only seldom, or after the lapse of much time, that specific value is capable of such proof). Now, my idea is that instead of relying to too great an extent on morphological differences we could fix the value of those modifications by analogy or comparative value. That is, if I should say that certain species (and giving a list, say of 25) represent my idea of specific value, I think students would get a better idea of what I meant than if I should spill any amount of ink in definitions and controversies. On the other hand, I could give a list of so-called species that did not represent my idea of true specific value. I can give a better idea of my meaning on this subject when I come to compare the value of our species and when I refer to them as now listed. Our species were described by a number of authors, and therefore represent to a large extent many individual ideas. However, our last Catalogue (that of 1884, by Mr. W. H. Edwards) gives the list of species according to the best knowledge and belief of our foremost student of the diurnals.

I shall speak of the great variation in insects and say something of its causes, especially in the Lepidoptera. Some of our writers seem to have ignored absolutely the lessons these variations teach, especially when describing species. We have been so busy describing species and doing systematic work in this country that we have not had time to look into those interesting biological problems that have received so agos, while dry semi-withered food produces dark imagos of small size. Heat accelerates the pupal stage and cold retards it and the effect is shown in the imagos. The character of the season influences the resulting imagos and also the number of broods. Sometimes species which are usually single brooded may in special season become double brooded, and those which are normally double brooded may produce an additional brood. The individuals of these different broods differ and in some cases to such an extent as to have been described as different species. Nearly, if not all, butterflies produced from wintering chrysalids are different in appearance from the subsequent summer brood or broods. *Pieris napi* and *rapæ* are whiter with the blackish markings nearly obsolete. *Papilio turnus* from wintering chrysalids in this locality look like the Arctic form. Species of *Lycæna* in their spring dress are very different from those produced later. Even what might be called anatomical differences are produced by season; thus in some of the Lycænidæ the spring brood is tailless, whilst the summer generation of the same insect is provided with these appendages.

In passing from the sub-tropical heat of the Rhone Valley through successive zones which are to be met with before reaching the perennial snows of the Gorner Grat and the peaks overhanging the Riffel, a collection of insects may be made which represents in temperature a difference of latitude as great as from Italy to Scandinavia. I am quite positive that if studies were made from large amounts of material from different localities the observing student would soon learn to tell from whence a given specimen of a species came, from its appearance alone. This is specially true of forms having a wide geographical range.

In *Anthocharis belia* by prolongation of the pupal stage we get var. *ausonia* which has the underwings (underside) white with yellowish green blotches, instead of being green with silvery spots. The spring brood of *Vanessa antiopa* has whitish wing borders instead of buff. In Holland a pale yellow border, and in Sweden, Norway and Lapland have white borders throughout the year. The same species from Pennsylvania can be distinguished from California examples, the latter being more nearly related to the European form. *Lycæna agestis*, a well known little brown butterfly, with a marginal row of rich orange spots, common in the south of England during May and August, when producing but a single annual brood, appears in July as a variety (*artaxerxes*) that presents the black spots on the wings replaced by white ones, and which was for a long time on that account regarded as a distinct species.

It has become an established fact that those color-bands with charming ocellated spots that so enhance butterfly kind, should everywhere vary, and in certain localities vanish; and many drab and brown wings fluttering among grass and shade, and from time to time have exhibited hillsman's spots that have caused a cry of new species, or prompted experts to enter on description where others see but variety. The large Heath Butterfly may be reckoned among these. This kind in the north of England at an elevation of two thousand feet, according to Mr. T. Marshall, and in some parts of Ireland, according to Mr. Birchall, has the eyes painted on its sandy wings greatly decreased in number; and on the Perthshire Mountains, conjointly with the English type, an aberration is sometimes seen even less ocellated, and this anomaly we find has established itself in Lapland as the local form *isis* of the species, the most boreal variation. Our species are said to be darker than the same or allied forms in Europe.

It has frequently been noticed that in the mountains of Europe, as well as in this country, that as we ascend the butterfly becomes smaller and darker and their sexes often lose the color differentiation. Woody coverts and proximity to the sea, as also the smoke of towns and manufacturing districts, are associated with variety and melanism. The system of variation in such localities is the same and the cause is constant, while external conditions of environment are multifarious. Thus the shades of New Forest afford a constant variety, *valesina* of *Argynnis paphia*, which instead of being fulvous is brown and spotted instead of streaked along the nervures; it will thus be noted that altitude produces much the same effect as shade." *Erebia blandina*, from Morecombe Bay, has the brown bands on the fore-wings replaced by yellow.

on low moss lands, on which water is charged with iodine, in Cumberland, Westmoreland and Lancashire, it is a rich fulvous brown insect, larger and stronger built; and when these are acted upon by hydrochloric acid gas they assume the exact color of the hill specimens. The dark Annulet moth (*Gnophos obscuraria*) on chalk lands is a light colored grey or drab insect. In carboniferous limestone districts it is a lead-colored insect, whilst on the New Red Sandstone formation it varies from a rich ochreous color where oxide of iron is present in the soil to a dark, almost black insect on the white sandstone parts of the New Red formation, thus clearly pointing to geologically caused changes of color. Any of these latter forms acted upon by chlorine appear as highly colored grays. The same remarks apply to *Dianthœcia carpophaga*. On chalk it is light buff; on "New Red" here, darker; but all buff in Cambrian at Llangollen; and at Penmaenbach darker still, buff or ochreous brown; and on quartoise early rock, rich dark cold grey-brown, as in the Isle of Man, and at the Howth, in Ireland, ochrey shades being rarely observable upon them; but, acted upon by hydrochloric acid gas they all turn to a beautiful bright light fawn buff, veritable *carpophaga* of the chalk.

It is to be observed, however, that some varieties we might be inclined to attribute to certain formations may be the result of a food proper to the soil. Thus in the cases of the Welsh Wave Moth (*Acidalia contiguaria*), bred continuously on heather from moss lands, all specimens become varieties, fumose specimens, whilst fed on succulent plants they are large light colored specimens, rarely darkish, but never so dark as when fed on heather from the moss. "We find seasonal varieties not alone alternating in ordinary years, but witness their production by fluctuations in annual temperatures. Thus while many butterflies produce one or two annual broods, in certain years, those ordinarily single brooded become double brooded; or those which are double brooded produce three annual generations."*

I now wish to apply some of these facts to our own Lepidoptera and wish to say in the beginning that want of exact localities and exact data on our specimens has been most pernicious and detrimental to all such studies. In many cases specimens are without localities or dates of capture or only have a State locality. Studies of variation produced by geographical variation in the broad sense indicated, or the effect produced by seasonal broods, are impossible without such data. I also wish to condemn, in the most emphatic way, colored squares, silver or beautiful golden ones in the same way, and also numbers unless the absolute data and locality are also given. After many years lists which refer to numbers are lost, or the makers have not indicated on the lists what they mean, and many a time I have been driven frantic in looking over old collections. As a friend once said, God alone knows what they mean, and He won't tell. When I commenced my collection I was satisfied to have a single pair to represent the species, but now I cannot get enough individuals to represent all manner and kinds of variation brought about by natural causes. In the past I therefore knew this species or that, but now in many of our genera I nearly get brain fever in trying to determine where a species begins or ends.

---

* I am indebted to Insect Variety, by A. H. Swinton, for these facts in relation to European Diurnals.

In looking over our lists I would divide the species, so-called, into two classes, species and gradational or geographical forms. It should be remembered that most of our American entomologists were located in the Eastern part of the United States and were familiar with our Eastern species. When specimens were received from the West, more particularly the Pacific coast, it was of course seen that there was a difference between the Eastern and Western forms, especially where a few specimens were examined. This led to the description of new species (so-called), but there was a total ignorance of distribution, or what gradations or variations might be found between the extremes of localities. The same thing in a lesser degree occurs now. We are dependant upon specimens from localities where collectors accidentally happen to be, and our specimens (or species) show marked variations, in many cases due only to difference of locality. Nothing can be more pernicious than determining species from locality, yet some naturalists advocate this. The very fact that you determine a species by locality shows considered tentative only, and when the intervening gradational forms are found the true value of the new form should be recognized. The trouble with which we have to contend in such cases is that if we revise the work of others we are very apt to make them our enemies, and unpleasant controversies arise.

It has been said that there is no such species as *Papilio ajax* but the forms *walshii*, *abbotii*, *telamonides* and *marcellus*, which together make the species *ajax*. I do not object to this so long as the relationship is made apparent, but I would consider it entirely wrong to list these as distinct or specific names. The fault I find with our lists is that there is no exact comparative value among our so-called species. In one instance relationship may be thus indicated, and in other cases parallel value or relationship has not been so recognized.

I now propose to take a glance at our species and give some opinions as to their comparative value. I do not say that my ideas always represent exact facts, but I think they will incline toward the truth and indicate what lines of study may be taken up in this contention. I do not mean to be hypercritical toward the work of our American students, as their work equals that done in any part of the globe. Moreover I do not see how any one can suppose that the naming of a new species indicates the value for all time, as names are only tentative until proven absolute, as far as the doctrine of evolution will allow.

In our own country we have the wonderful effect of vertical distribution, seasonal changes, differences of soil, climate, food, geology and, in fact, everything which suggests itself in this connection. In the genus *Papilio* we have twenty-six named as entitled to specific rank. Of these twenty-six nine are of doubtful value in varying degrees and I would arrange them thus, *thoas*, *pergamus*, *hollandii*, *brucei*, *nezahualcoyotl*, *oregonia*, *nitra*, *rutulus*, *brevicauda*, those of least value being mentioned first and the rest following in order given. *Thoas* is a synonym of *cresphontes*, *pergamus* of *indra*. *Rutulus* is probably a horizontal race of *turnus*, and was described as such by its author Boisduval. I have a specimen of *Papilio* taken here (Philadelphia) that would pass as *rutulus*. I believe a sufficient number of specimens of *turnus* and *rutulus* representing geographical distribution would prove their identity. I may say right here that I believe the imago the culmination of nature's effort, and that while studies of transformation are most valuable they will not solve the problem of specific difference or identity. It would take too much space to go into details in regard to all these, and I will only give opinions in most instances. *Brevicauda* would also have to be studied from the standpoint of distribution. *Nezahualcoyotl* is the *brevicauda* of *philenor*. Do some of these forms differ any more from their nearest allies than the extremes of the vertical distribution of *turnus*? Take, for instance, the Arctic form or the form from wintering chrysalids in this locality (Philadelphia). I have two females of *turnus*, one from Philadelphia and the other from Florida. One expands 3 inches and the other 6; the Florida example thus having a greater expanse of 3 inches. They differ as markedly in other ways, the Southern form being a rich orange and the local one almost white.

I have nothing to say about our species of *Parnassius*, except that I doubt that the true *nomion* has been taken in North America.

In *Pieris* we have ten species, and of these I consider three of doubtful value—*nelsoni*, *virginiensis* and *occidentalis*. The putting *virginensis* as a var. of *napi* and also as a species was probably the work of the printer's devil. Looking at the list and seeing var. *vernalis* of *protodice* reminds me of the fact that all butterflies to a greater or less extent differ in the spring or generation from wintering chrysalids, from those produced from eggs of the first, and if seen fit all should be called *vernalis*. Thus the spring generation of the Himalayan *Papilio polyctor* is called variety *vernalis*, and properly so, but the spring generation of *Pieris occidentalis* is called *calyce*. Would it not be better to call all spring variations the variety *vernalis* of the different species where the spring generation is different from subsequent broods. Some of the varietal names of species of *Pieris* are also synonymous of forms found in Europe. For instance, in Alaska we have var. *bryoniæ* of *napi*, of which I believe *hulda* is a synonym.

In *Anthocharis* we have fifteen species. Of these *flora*, *rosa*, *reakirtii*, *thoosa*, *stella*, *julia*, *hyantis* and *morrisonii* are of doubtful genus twenty species. Of these we have *harfordii*, *moina*, *alexandra*, *edwardsii*, *emilia*, of doubtful value. Now, in regard to *hecla*, *meadii* and *elis*, we know them from Greenland and Iceland, Laggan and Colorado, but do we know that they are not found over the intervening territory, and do we know that if they are thus found they would not show intergrades or evidences of the effect of vertical distribution? The Lapland *hecla* is quite different from the Greenland one, and shows as much difference as some of our so-called species. *Danais strigosa* is likely to prove a variety of *berenice*.

In the genus *Argynnis* we have fifty-eight species, of which about eighteen are of doubtful value. I have a large amount of specimens with proper data and the more I get the less I know in one direction (in relation to species as listed) and the more in regard to the real value of variation. The wonderful and interminable variation in this genus has already been pointed out. The presence or absence of silver spots below is in many species of no value whatever, and my studies would lead me to believe that an unsilvered form always has a silvered form, of regular or irregular appearance, except in a few such species as *alberta*, *astarte*. We may also have hybrids each year which occur annually, yet, of course, do not actually reproduce their kind. The difference produced by vertical and horizontal distribution is tremendous. Take, for instance, *cybele* from Maine and Florida, the difference is fifty-fold greater than between *aphrodite* from Maine and *aphrodite* from Colorado (*cipris*). *Aphrodite* from Maine and from the mountains of North Carolina are also wonderfully different in size and maculation and really differ to a greater extent than some of the gradational forms listed as species. I am studying this interesting genus and will now point out so-called species which show gradational forms or have been proven one and the same thing. I have found white females of *cybele* like unto *leto* and would refer reader to Ent. News, Vol. V, p. 318.

We want to know more about *nitocris*, but can't do anything until we get more material. *Cipris* is the form of *aphrodite* found in Colorado. *Alcestis* I have, showing every intergrade into *aphrodite*. *Electa* is so close to *atlantis* as to hardly warrant a varietal name and differs no more than other local forms of *atlantis*. The one found at Nepigon is not exactly like either. The forms clustering around *monticola* and *rhodope* are legion, hardly any two being alike. *Chitone* has hardly any two individuals alike and there are all grades of silver spots beneath—from nothing to a silver mine. *Inornata* is probably an unsilvered form of some of the other known species. *Artonis* (unsilvered) has been taken in coitu with (*eurynome*) silvered, both ways, female *artonis* and male *eurynome*, and male *artonis* and female *eurynome*. This is also true (I think) of the *eurynome* found in Alberta, N. W. T., and the unsilvered *clio*. There is no doubt about these being all one species, and we may possibly add to them *opis* and *bischoffi*, the latter representing the upper end of the vertical chain, it being the dark arctic form which we would naturally expect. We need more information about *columbia*, *hippolyta*, *semiramis*, *liliana*, *laura*, *rupestris*, *macaria*, *egleis*, *bellona* and *epithore*. *Carpenterii* is the Alpine form of *cybele* and it is of interest to know that it has been produced in Colorado and Arizona by altitude and in British America by latitude. A friend has recently told me he was sure he had seen the form *alcestis* flying with *aphrodite* in North Carolina. Some of our smaller species are also gradational geographical forms, as, for instance, *montinus*, *boisduvalii* and *butlerii* may also come in this category.

In regard to the *anicia* group of *Melitæa* I have the wisdom of Socrates, "I know that I know nothing; others know not even this." I have species, lots of them of value equal to those already described. *Wrightii* is the Southern form of *leanira*, and I have intergrades. Most of our specimens of *leanira* came from San Francisco and of *wrightii* from Los Angeles Co. Let us have the gradations from between. *Sterope*, *acastus*, *palla* and *whitneyii* are dangerously close. I should have said that *alma* is the desert form of *leanira*, and *fulvia* is very close to *alma*, if not the same. *Hoffmanni* I believe to be an aberration of *whitneyii*. *Perse* and *chara* are probably seasonal forms of one species. *Thekla* I take to be an aberration of *bollii*.

Phyciodes batesii needs investigation. I mistrust its specific value. *Camillus* is probably the central area form of *pratensis*. Mr. Edwards has established the identity of *Synchloë adjutrix* and *crocale* from the

Satyrus needs study and revision, and I do not care to say much about them now, only that *ariane* has almost less than varietal value. Mr. Edwards has published a most interesting and instructive account of the species of *Chionobas* found in California, Oregon and Vancouver. He shows that these forms differ slightly and also shows that in the certain localities where they have been taken (where collectors are accidently found) the characters of the localities are different. He also says they are not found in the intervening territory. Now from my point of view I would not expect them to be the same if taken many miles apart, but would expect to find certain differences of less than specific value. The part of his argument which does not seem to me to be conclusive or proven is the alleged fact that the forms are not found in the intervening territory. I think they are probably found in places and that they would show the gradational, geographical, vertical, distributional differences seen in all Lepidoptera. I know this to be absolutely true of other species occurring in Oregon and Vancouver, and that they differ as much if not more than do *Chionobas californica* and *gigas*. This is true, for instance, of *Parnassius clodius*. Are we, therefore, to give one of these forms a new name? Of the *semidea* group I have nothing to say at present. *Libythea bachmani* and *carinenta* I believe to be one species, *larvata* probably being a variety of the latter form. *Carinenta* differs from its more northern representative in the same way as many other butterflies found North and South—for instance, like *Pamphila* var. *egeremet* and *otho*. *Lemonias mormo*, *duryi*, *cythera* and *virgulti* need investigation both geographically and in regard to seasonal broods. *Calephelis* species are open to some doubt. *Thecla* and *Lycæna* need study badly, also from the geographical and seasonal standpoints, especially the latter. All Lycænidæ should have on pin *exact date of capture* as well as exact locality. *Melinus* is a species of great variability and found all over the United States; it is the same thing whether from Maine, Vancouver, Florida or Arizona—the same tune but with variations. There are too many to mention, and I am sure there will be a certain amount of dropping in values.

In *Chrysophanus*, on a guess, I should say *arota* and *virginiensis* were perhaps seasonal differences and *xanthoides* and *dione* differ because the one is found in California and the other in Iowa. *Florus* would seem to be a variety of *helloides*, if it is not the *dorcas* of Kirby. The Greenland *hypophlæas* differs wonderfully from Pennsylvania specimens, and is more entitled to specific value than is *sirius*, the more Eastern *rubidus*. The one shows the vertical differences and the other the horizontal effects of distribution. I am studying the genus *Lycæna* and think many names will eventually have the same value as those under *pseudargiolus*, of which we now have nine names. They represent what many of the others will in the future—gradational geographical forms and seasonal variations. When people put date and locality on the pins we will be able to find out these things. I have expressed my views in regard to *Pamphila*. See Can. Ent., Vol. XXVII, p. 261. The variations of *comma* should not be entitled to specific value. The species in *Nisoniades* are in bad shape and need careful study. I believe we have some synonyms among them. The species of *Aegiale* are interesting, and may be modifications produced by season, condition of food plant, etc. *Neumoegeni* is a very distinct species. The others are more nearly related.

DESCRIPTION OF THE LARVÆ OF SOME HETEROMEROUS AND RHYNCHOPHORUS BEETLES.

(Plate ~~IV~~ V, Figs. 1–6.)

BY H. F. WICKHAM.

The following descriptions have been written for the sake of making known to American students the immature stages of some of our beetles. In view of how little has been done in this country, it will not surprise most Coleopterists to hear that they all belong to genera in which none of the species peculiar to our continent have yet been studied in the larval state.

jointed, although what appears as the first joint may possibly be merely a cephalic process. The second and third joints are of about equal length, though the third is of much less diameter; the fourth is small and springs from a termino-lateral point instead of from the center of the tip of the third. Mandibles very heavy; in lateral outline they show a strongly bidentate tip, while the inner edge near the base is serrate. One mandible (in a balsam mount) shows also a strong tooth just above the serrated portion. Maxillæ with subcylindrical outer lobe, which is somewhat smaller toward apex; inner lobe sub-reniform, face with numerous shortish spines; palpus 3-jointed, joints not greatly differing among themselves in length but decreasing gradually in thickness. Mentum slightly elongate, truncate at tip, ligula with sides oblique from the base to the broadest portion, which is slightly posterior to the point of insertion of the palpi; angles rounded, apex with median prolongation bearing at tip a pair of rather short divergent bristles; palpi two-jointed, the second joint slightly shorter and much more slender. A dissection exposing the upper floor of the labium shows a basi-median parabolic band of pubescence (see Fig. 1, mt.), surrounding a strong brown chitinous piece, articulated to another support at its posterior extremity. A similar structure is found in the mouth of *Hymenorus*. Clypeus about twice as broad as long, narrower anteriorly, angles rounded; labrum somewhat semicircular in outline, surface bristled as shown in figure.

Prothorax longer than the meso or metathorax, the last two about equal to each other. Abdomen of nine segments, the first seven differing but little in length among themselves, the eighth a little shorter, the ninth much so; it is terminated by a pair of short spines springing from the dorso-posterior margin. Legs short, coxæ conical, trochanters triangular in lateral view, outer side much the longest, femora broader at tip, tibiæ narrowed to apex, claw curved, simple, bearing two bristles near the base on the lower surface. Spiracles nine, the largest situated near antero-lateral mesothoracic margin; segments one to eight of the abdomen, each with one near the latero-median point.

The specimens described were given me by Dr. F. E. Blaisdell, who obtained them in woody fungi in Calaveras Co., California.

Meracantha contracta *Beauv.* (Fig. 2.)

Form elongate cylindrical, not tapering; color yellowish or brownish, the head and dorso-median portions of all the segments darker, ventral surface paler than the upper. Length of full grown specimen 19 mm. Head slightly narrower than the prothorax, shining, rather finely and not densely punctured; there is an impressed line on the front extending in a parabolic course from the base of one mandible well up on to the vertex, thence curving around and running down to the other mandible. Bristles few but long. Antennæ four-jointed, first joint much broader and somewhat longer than the second, which is in turn slightly broader but much shorter than the third; fourth joint very small, tipped with one long and two short bristles. Ocelli are situated on the sides of the head behind the bases of the antennæ. Labrum transverse, sides rounded, anterior margin truncate and slightly sinuate, angles broadly rounded. There are three long bristles on each side and a series of about fourteen shorter ones around the margin. Mandibles very heavy and strongly toothed; a side view is figured; other aspects show that the tip is emarginate or bidentate. Maxillæ armed on the inner face with a regular series of strong spines; there are also a few smaller scattered spines on the surface. Palpi three-jointed, first and second joints about equal in length, the latter narrower, third joint smaller and shorter. The second joint bears two very long bristles, the others are smooth. Mentum subcordiform in outline, ligula very small, tipped with two short spines, palpigers broad, palpi heavy, the first joint much smaller than the second.

Prothorax about twice as long (on dorsal surface) as the mesothorax, the anterior side margin oblique, so that the segment is shorter on the ventral surface than on the dorsal. The scute is slightly roughened, but shining, the whole anterior margin marked with very fine longitudinal rugosities. The mesothorax is short, the metathorax about one-half longer, surface sculptured like that of the prothorax except that there are none of the fine longitudinal rugosities. Abdomen of nine segments, the first eight of which are almost alike, very convex above, These larvæ are found occasionally about rotten wood near Iowa City and are remarkable for the shape of the last abdominal segment. The change to pupa takes place in April, one of mine pupating on the twenty-second of the month, the beetle appearing on May fourth. The pupa is white, lying naturally in a curved position. Length, measured along the chord of the arc, 14 mm. The sides of the abdominal segments are armed with flattened processes, bearing each a short spine at tip; these processes are two in number on each side of the second, third, fourth and fifth segments; on the first segment there is but one, a short one, while the single one on the sixth is of moderate size. The last segment is excavated above and armed with a pair of long sharp terminal spines.

Hymenorus obscurus *Say*. (Fig. 3.)

Larva very elongate, slender, subcylindrical; back very convex, venter flattened, and with a longitudinal furrow on each side. Color, in life nearly white, in spirits yellowish, surface shining. Length, 12 to 13 mm. Head about as wide as the prothorax and of darker color than the rest of the body, antennæ four-jointed, first and second joints about equal in length, the first broader; third joint about one and one-half times as long as the second, rounded at tip, a ring of small spines surrounding the subterminal enlargement; fourth joint small, papilliform, trisetose at tip. Labrum more than twice as broad as long, sides rounded, apex truncate or very slightly emarginate, margin bristly, a few scattering spines on the surface, under face with a parabolic band of small spines (See Fig. 3 lbr.). Mandibles very heavy, deeply emarginate, strongly toothed, and with a broad basal molar portion. Maxillæ with two rows of very strong spines on the inner face, as well as numerous scattered ones. Palpal joints decreasing gradually in thickness, apparently four in number, as shown in Fig. 3 max.; there is, however, some slight damage done to the basal portion in my preparation, so that I do not feel quite sure. The last joint has a fringe of small spines around the tip. Labium of moderate size, palpi thick, second joint narrower; the prolongation of the tip of the ligula is of considerable size, nearly reaching to end of first palpal joints, and bears at apex two bristles about equalling it in length. The chitinous supports are two—the basal piece about as broad as long, rounded at base, rather deeply emarginate and distinctly sinuate at tip, angles prominent; the apical piece elongate, narrow and deeply notched at tip. Prothorax longer than the mesothorax and metathorax, which are about equal to each other in length. The mesothorax bears a spiracle on each side in front of the coxæ. Abdomen of nine segments, the first eight about equal in size, each bearing a pair of spiracles, which are situated near the antero-lateral margin; ninth bluntly conical, bristly, beneath with a pair of papilliform appendages projecting from beneath a plate lying near the anterior margin. Legs moderate in length, very bristly, coxæ very prominent, claw not toothed.

The larvæ were found in a rotten oak stump, and were at first taken to be Elateridæ. The change to pupa took place April 27th, the beetle appearing May 6th. The pupa is white, 7 mm. long; sides of abdomen with compressed three-toothed processes; terminal segment with two short curved spines.

Acamptus rigidus *Lec.* (Fig. 4.)

Living larva white, head yellowish, mandibles castaneous. Form rather short, robust, position at rest, curved. Length 5 mm., width almost 2 mm. Head large, deflexed, oval in frontal view. A rather deep impressed line runs the length of the median region above. Surface rather sparsely bristly, the bristles longer and more numerous near the sides. The antennæ cannot be made out distinctly, but are very short and borne in pits over and outside of the mandibles. Eyes are wanting. Mandibles heavy, triangular, strongly chitinized, inner edge sinuate and with a strong tooth near the tip. Maxillæ heavy, basal portion furnished on the masticatory face with several (eight or nine) strong articulated spines; palpus two-jointed, the joints thick, basal one the thicker and somewhat the longer. Mentum mostly membranous, the basal portion therefore indistinctly limited. The terminal part bears four moderate spines at tip; the palpi are two-jointed, the basal joint much the longer. Thoracic segments membranous, broader than the head; they do not bear legs, but each has on the ventral sur-point about five feet from the ground, an injury which had removed the bark, the exposed place then being attacked by the large horn-tail, *Tremex columba.* For about an inch from the surface the wood was quite hard, but inside of this shell was quite badly decayed and soft. The young *Acamptus* larvæ were found just entering the soft wood on sides of the Tremex burrow, while the large ones were taken at the end of a gallery of an inch or two in length, this gallery having its origin from the side of that of the *Tremex.* The full grown larvæ had formed, at the date mentioned, rounded cells, apparently for pupation; these cells had no evidence of silk in their construction. Mr. Wolcott has kindly furnished a drawing to illustrate the work of this larva (Plate IV, Fig. 6). The burrow of the *Tremex* is shown at Tr, while that of the *Acamptus* is marked Ac. The black spots in the latter show where the larva had made short secondary burrows for the depth of an eighth of an inch or so. All of the larvæ taken by Mr. Wolcott were found with the head pointing upward, whether the burrow ran up or down. This may simply be the position of rest for the winter. A few adults were taken with the young, at the date cited, but they were more numerous in November preceding. None have been seen on the outside of the tree, nor do any of the healthy trees seem to have been attacked.

Yuccaborus, sp. (Fig. 5.)

Larva robust, natural position curved, consistence soft. Color nearly white, head testaceous, mouth dark brown. Head more strongly chitinized than the rest of the body, its upper surface sparsely bristled, median line distinct for about one-half of the distance from the hind margin when it forks, separating into two lines, one of which extends towards each anterior angle. Antennæ extremely short and contained in pits at the sides of the head near the mandibles. Clypeus separated from the front by a distinct suture; in form transverse, approximately, thrice as broad as long, narrower anteriorly, sides oblique. Labrum as broad as the anterior margin of the clypeus but shorter than the sclerite, sides rounded, bristled as shown in the figure. Mandibles extremely heavy, triangular in outline, the inner margin irregular but without defined teeth. Maxillæ with very heavy base, inner face flattened and armed for about one-half of its length with a dense covering of bristles. Palpi two-jointed, the first joint much stouter than the second. Labia palpi two-jointed, almost like the maxillary; the ligula is emarginate at tip, and each of the projections thus formed bears a bunch of bristles at apex. Prothorax about as long as the meso- and meta-thorax combined, dorsal shield strongly chitinized and with a yellowish tinge. There are no legs, but each of the thoracic segments bears on its ventral surface a pair of setigerous tubercles which are doubtless locomotive in function. Abdomen increasing gradually in size from the first to the third segment, thence gradually decreasing to the fifth. The remaining segments (apparently three in number) are much smaller than the preceding and decrease more rapidly in size. The eighth segment is deeply and broadly longitudinally sulcate, each of the lateral ridges (one of which bounds this excavation on each side) bearing an elongate setigerous tubercle near the anterior and another near the posterior border. The whole ventral surface of the body is traversed by rather deeply impressed longitudinal lines, which, running crosswise of the segmental incisions, give a somewhat tuberculate appearance to this region. On the dorsal surface the plications are parallel to the segmental incisions. Length 10 mm.

Pupa tolerably closely reproducing the form of the beetle, the head and beak sparsely set with short and sharp spines. The pronotum bears a pair on the median line near the base; on each side of and a little posterior to this middle pair lies another pair, and, still exterior, another. The anterior portion of the pronotum bears one spine on each side near the front margin, separated from each other by a space somewhat less than the width of the head; behind and somewhat to the side of these spines are two others, one on each side. The meso- and meta notum each bear two rows of spines which converge posteriorly. The abdominal segments are armed with transverse rows. Length 12 mm.

Numerous pupæ and adults with one larva were found near Brownsville, Texas, infesting a dead yucca. They occur in the decaying portion immediately underlying the old bases of the leaves. The specific

THE LIFE-HISTORY OF THE FLORIDA FORM OF EUCLEA DELPHINII.

BY HARRISON G. DYAR, A. M., PH. D.

(Plate V, Figs. 1-13.)

Larvæ found at Lake Worth, Florida, in January, 1896, differed from any previously seen by me, and were supposed to represent some species of *Euclea* or *Monoleuca* not previously bred. However, the moths which emerged proved to be *E. delphinii.* I present herewith an account of their life-history in advance of that which Miss Morton and I will work out of the New York form, since I have been fortunate enough to observe all the stages. I am much indebted to Mr. F. Kinzel, of Palm Beach, for a supply of food plants during the winter months.

The larvæ are nearest in pattern and structure to the form provisionally called *E. pænulata* (*elliotii*) by Miss Morton and myself (Journ. N. Y. Ent. Soc., III, 146). They differ in coloration and in having a pair of caltrope patches on the subdorsal horns of joint 13, which are absent in *pænulata.* In both there is a single group of detatchable spines and the subdorsal line is unbroken by discolorous patches. The synonymy and relations of the several forms of the *delphinii* group, as well as figures of the caltropes and spines will be deferred to our paper on the New York species, where we hope to discuss these matters in full.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal and lateral spaces broad, subventral space narrow, contracted; ridges very slight, the lateral the most distinct, approximate to the subventral. Fleshy horn-like processes unequally elongated; in stage I bearing primitive setæ; after first molt the subdorsal and lateral rows covered with numerous urticating spines, mixed with less developed spines bearing setæ; subventral row rudimentary. The subdorsal horns are well developed on joints 3 to 5 and 11 to 13, moderate on joint 8, very small on 6, 7, 9 and 10, but none are rudimentary as they are in *Sibine.* Of the lateral row the one on joint 5 is absent.

Depressed areas feebly developed, usually only their pale glandular centers visible, under favorable circumstances also the areas themselves as slight hollows, smoother than the general surface; dorsal row (1) paired, double between joints 3-4 and 4-5, ad-dorsal (2) slight;

the lateral row (4) and lower intersegmental lateral (6) quite distinct, the former reniform.

Skin at first smooth, in the later stages covered with minute clear, conical granules, rather sparsely distributed. These little granules are intermediate in development between the sharp-pointed skin spines of *Sibine* and the low, rounded, smooth, colorless granules of *Apoda*. They are not present on any of the horns, which are armed only with the spines and setæ. Caltrope patches appear toward the tip of the horns of the lateral row at about stage VII. They are present on joints 6 to 12 and also on the subdorsal horn of joint 13. In the last stage a single pair of detachable spine patches appears, situated above the subdorsal horn of joint 13, the patch small, slender, obliquely truncate.

The coloration is on the whole mimetic and adapted to escape observation. These larvæ persistently hide by day in their native habitat, creeping into curled leaves or any other similar protected place on their food plant.

The larva is closely comparable with *Sibine* (Journ. N. Y. Ent. Soc., IV, 2), on the whole slightly less specialized, as seen by the smaller and imperfectly developed detachable spines and the less unequally developed horns. Its skin structure is, however, considerably higher than that of *Sibine*.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Eggs.—Laid singly, or in patches of two to seven, slightly overlapping. Flattened, the upper surface low arched, elliptical, but not of a constant shape; 1.6 x .9 x .2 mm., or about these dimensions, varying in thickness as well as in outline. Nearly transparent as seen on the leaf, milky whitish on glass, and pale lemon yellow on white for the smallest horns to be crowded toward the neighboring large ones, whereby the subdorsal horn on joint 6 approaches the one on 5, that on 7 the one on 8, etc. Setæ rather long, stiff, sharp pointed, three from the apex of each horn. Cuticle perfectly smooth, transparent. The larva is pale yellowish, the color of the egg, without marks. It does not feed at all in this stage, becoming quiescent immediately after hatching and molting in three days. Length of larva 1 mm.

Stage II.—Subdorsal horns on joints 3 to 5, 8, 11 and 12 large, rounded, bristly with stiff, black-tipped spines; those on joints 6, 7, 9 and 10 very small, rounded, each with one spine; lateral row with many spines, the horns on joints 3 and 4 larger than the rest. Body squarish, ridges marked by the large tubercles, widest through joints 3 and 4. All pale yellowish white, much more opaque than before. Skin finely granular dotted; no marks. Head pale, eye black, mouth brown, width .3 mm. Toward the end of the stage the horns of subdorsal row on joints 4, 5 and 11 become brick red in some examples. Length 1 to 2 mm.

Stage III.—Very shining, green, but principally from the alimentary canal showing by transparency. A narrow, faint yellow subdorsal line along the ridge; horns on joints 3 to 5, 8, 11 and 12 bright red; lateral row colorless with green tips. The horns are moderately well covered with black-tipped spines; the subdorsal ones on joints 6, 7, 9 and 10 have only one or two spines. Skin finely and rather remotely watery granular. Dorsal and ad-dorsal depressed areas indicated by whitish dots, also the large lateral intersegmental (4). The larvæ eat rounded patches on either side of the leaf (Plate V, Fig. 13). Width of head .4 mm.; length of larva 2 to 3 3 mm.

Stage IV.—Resembles the mature larva in shape and appearance. Green, a narrow yellow subdorsal line, the same horns red as before. The subdorsal horns on joints 6 and 10 are very small with three or four spines, those on joints 7 and 9 moderate with six to eight spines. A narrow pale dorsal line. Double intersegmental dorsal, ad-dorsal and two lateral obliquely set rows of white glandular dots. The lateral horn on joint 4 is a little larger than the others. Head whitish, the eye black; width .6 mm. Skin granules rather remote, concolorous or colorless, non-setiferous, conical but not sharp pointed, about .005 mm. in diameter. All the horns are smooth, without skin granules. No trace of caltropes. Length of larva 3.3 to 5.3 mm.

Stage V.—Head shining, very pale greenish, eye black, mouth brown; width .8 mm. Green; the skin transparent with a faint green tint from the blood, the effect increased by some bright green pigment, not evenly distributed. In the dorsal space it is absent between the large horns, being therefore especially noticeable in two square patches on joints 6–7 and 9–10. Between these patches and the yellow subdorsal line is a slight space which will become the waved dark green line; but as yet it is not indicated. Yellow subdorsal line broad, irregular. In the lateral space the green pigment is situated in a band below the subdorsal line, separated from it by a space which is already defined faintly as a dark green line. The green pigment encloses the upper intersegmental whitish dots, but below this the body is only green from the blood. A narrow distinct whitish dorsal line. Horns greenish except the six red pairs. The short horns are as well spined as the long ones, in proportion. Skin finely watery granular. Length 5.3 to 7 mm.

Stage VI.—Elliptical, flattened, highest through joint 5, though not conspicuously so. Green, dorsum flat, not tapering much at the ends, yellowish green, a narrow yellow dorsal line and a dark clear green waved line above the subdorsal band; intersegmental glandular dots whitish; the green band is most pronounced on joints 6 to 10, giving the appearance of a central darker green patch, but this disappears under a lens. Subdorsal line rather broad, yellow, extending from joints 3 to 13. Horns short and slender, the longest ones on joints 3, 4, 5, 8, 11 and 12 bright red, the others moderate, colorless. Lateral space nearly colorless, shaded with light green on the lateral ridges between the depressed spaces, two rows of white glandular dots in the broad intersegmental hollows. Lateral horns rather long, alike, pale green, those on joints 3 and 4 tipped with brownish. A broken, pale lateral line. Subventral space contracted, colorless. Head green, jaws brown, on the upper side of the lateral horns of joints 6 to 12 and on the sides of the subdorsal horn of joint 13. Larva pale yellowish green, a yellow subdorsal band below the skin on joints 3 to 13, edged below by a dark green line, narrow, rarely partly replaced by red (Plate V, Fig. 3); a deeply waved green line above the subdorsal and lateral ridges, both edged with yellowish. Dorsal yellow line faint. Intersegmental glandular dots whitish. The subdorsal dark line is faint at the extremities, but gives no longer any appearance of a central patch. Skin sparsely watery granular. Width of head, about 2.5 mm.; length of larva, 14.5 to 20 mm.

Cocoon and pupa as usual. The cocoon is 11 x 6.5 mm. in size and is surrounded by a slight irregular web; color, dark brown.

Food Plants.—The larvæ were found each on a different plant, as follows: Mangrove (*Rhizophora mangle*), Sea Grape (*Coccoloba uvifera*), Cocoanut Palm and *Coccoloba floridana*. All the four larvæ produced moths; the last two mated in the box, and I obtained from them eggs and finally 95 little larvæ. These ate whatever was offered them, as is usual in the Eucleidæ.

EXPLANATION OF PLATE V.

Fig. 1. Larva stage 1, lateral aspect, semidiagrammatic × 50; head protruded.
Fig. 2. Larva stage 1, dorsal aspect × 40; head retracted.
Fig. 3. Mature larva × 5; three-quarters view, head retracted in the ordinary position of rest.
Fig. 4. Outer part of a thoracic foot of mature larva × 200 showing the claw and terminal setæ.
Fig. 5. Jaw of same × 50 seen from within.
Fig. 6. Spiracle × 50 showing radiate structure.
Fig. 7. A simple seta and tubercle, mature larva, × 50.
Fig. 8. Another, showing the tubercle elongated.
Fig. 9. The same, further advanced.
Fig. 10. A short urticating spine, the seta reduced to the piercing cap, the tubercle forming the poison-holding shaft.
Fig. 11. The same; a larger spine from a long horn.
Fig. 12. One of the exceptional flattened setæ × 200.
Fig. 13. Leaf showing the feeding traces of the larva in stages II and III, natural size

NEW SPECIES OF AMERICAN HETEROCERA.

By William Schaus.

Eurata helena, sp. nov.

Head and thorax black; two round yellow spots on collar. Abdomen above with segments 1–3 crimson, 4 and 5 yellow; otherwise black; a broad black subdorsal line from the base and a tinge of black between the segments. Wings brownish black, thinly scaled. The primaries with two contiguous white spots near the end of the cell, and another spot below them; beyond the cell four white spots, the lowest very minute; at the base two minute yellow spots. Secondaries with two white spots at the end of the cell and the inner margin broadly crimson. Underneath the same. Expanse, 34 mm.

Habitat: Castro, Parana.

Eurata maritana, sp. nov.

Head and thorax black; collar with two large yellow spots. Abdomen with the basal segments crimson and a black and orange subdorsal spot, segments 2 and 3 black with lateral spots; segments 4 and 5 yellow separated by a transverse black band; otherwise black underneath, segments 4 and 5 are yellow. Wings smoky black. Primaries with an oblong creamy spot at the base; two large white median spots; four large white subapical spots. Secondaries with a trace of a whitish line at the end of the cell. Expanse, 36 mm.

Habitat São Paulo, S. E. Brazil.

Allied to *E. picta* H. S.

Syntomeida broadwayi, sp. nov.

Antennæ and head black with a metallic green spot. Collar black with two small metallic pale green spots. Patagiæ black with two similar but larger spots

Chloropsinus ænetus, sp. nov.

Body velvety black. Primaries dark bronzy green with the veins still darker. Secondaries smoky black with a faintly diaphanous streak at the base. Expanse, 33 mm.

Habitat: Castro, Parana.

Allied to *Chloropsinus viridis* Druce.

Eupyra ferens, sp. nov.

Head and thorax blackish. Three white points on the collar and one at the base of the primaries. Abdomen greenish black with a subdorsal, lateral, and ventral row of white spots. Wings dark metallic green. Expanse, 45 mm.

Habitat: Peru.

Allied to *E. bacchans* Schs.

Eupyra albicincta, sp. nov.

♂. Antennæ dark metallic blue. Head black. Collar white. Thorax black. Abdomen metallic blue; the base broadly white which gradually extends laterally and underneath. Legs black streaked with metallic blue and white; fore coxæ white. Wings metallic peacock blue, with the veins and fringe black; a large oval vitreous spot at the base of the secondaries; the cell and costal margin of the secondaries blackish. The ♀ differs in having a small vitreous spot on the primaries below the median vein at about the middle of the wing, and there are two small vitreous spots in the cell of the secondaries. Expanse, ♂ 45 mm., ♀ 50 mm.

Habitat: Chimbo, Ecuador.

I received this beautiful species from Mr. Oberthür.

Eupyra sylva, sp. nov.

Head and thorax brown; two minute white spots on collar. Abdomen golden brown; a large subdorsal white spot at the base and some lateral white spots on the first four segments. Primaries golden green with the following vitreous spots; a large one about the middle of the wing below the median vein; a small one at the end of the cell, and another minute one beyond the cell; near the outer margin a large spot between veins 3 and 5, crossed by vein 4. Secondaries brownish black; the inner margin with long white hairs; a large vitreous spot at the base, followed by a similar spot about the center of the wing. Expanse, 37 mm.

Habitat: Rio Janeiro.

Very closely allied to *E. cephalena* Druce.

Sphecosoma melissa, sp. nov.

Head white spotted with black. Collar yellow. Thorax yellow, with five black streaks. Abdomen: basal segment black with two yellow spots, the other segments yellow banded with black and a fine subdorsal black line. Legs yellow. Wings yellowish hyaline with the margins and veins finely brown; some yellow at the base of the inner margin on the primaries. Expanse, 23 mm.

Habitat: São Paulo, S. E. Brazil.

Cosmosoma lucia, sp. nov.

Body black above with a subdorsal row of metallic blue spots from the head to the anal segement. Underneath, thorax and legs red. Wings hyaline margined with black, widely at the apices; veins black, especially the discocellulars on the primaries. Expanse, 36 mm.

Habitat: St. Lucia, B. W. I.

Cosmosoma durca, sp. nov.

Body black with a subdorsal and a lateral row of metallic green spots. Wings hyaline. The primaries with the base and margins broadly black, the costa narrowly so; a black spot at the end of the cell. Secondaries with the outer margin black. Expanse, 31 mm.

Habitat: São Paulo, S. E. Brazil.

Cosmosoma dukinfieldia, sp. nov.

Head black with a blue spot. Thorax black, a grayish spot on the patagiæ. Abdomen black shaded with metallic blue at the base and laterally. Wings hyaline. Primaries with the base and outer margin broadly blackish brown; the costal and inner margins mottled pale fawn colour and black; a broad black spot at the end of the cell; all the veins black. Secondaries with the outer margin black. Underneath the thorax is spotted with metallic blue. Expanse, 42 mm.

Habitat: Castro, Parana.

Sansaptera, gen. nov.

Antennæ pectinated. Palpi porrect, second point long. Primaries long and narrow, the outer margin very oblique, the inner angle rounded; the submedian vein very short. Secondaries very minute, almost imperceptible, with the anal angle prolonged.

Sansaptera cocho, sp. nov.

Head black with two metallic points. Thorax black; two metallic blue spots on the collar. Abdomen black with a subdorsal and a lateral row of metallic scales; underneath white at the base. Primaries hyaline, veins and margins black, the patagiæ edged with black; underneath the coxæ and a large spot on the abdomen white. Wings hyaline with black margins. The costal margin of the secondaries white. Expanse, 28 mm.

Habitat: Trinidad, B. W. I.

Philoros marita, sp. nov.

Antennæ black. Head gray; orange behind the antennæ. Collar and thorax light brown; the patagiæ dorsally shaded with yellow. Abdomen black. Primaries light brown; the median, submedian and veins 3, 4 and 6, finely yellow; fringe yellowish. Secondaries dull black; fringe white. Underneath blackish gray, the disc of the primaries paler. Expanse, 30 mm.

Habitat: Castro, Parana.

Pygoctenucha dukinfieldia, sp. nov.

Head crimson. Collar crimson with a black lateral spot. Thorax crimson; patagiæ black. Abdomen black; anal segment crimson. Legs black; red at the joints. Wings dull black. Expanse, 51 mm.

Habitat: São Paulo, S. E. Brazil.

Allied to *P. bombycina* Perty.

Aclytia terra, sp. nov.

Head and thorax dark brown; a metallic blue point between the antennæ. Abdomen metallic blue; a subdorsal black line and transverse black bands on the segments; at the base long tufts of brown hairs; coxæ orange; a ventral orange band. Primaries dark brown. Secondaries black with a broad diaphanous streak from the base to beyond the cell. Expanse, 34 mm.

Habitat: Castro, Parana.

Allied to *A. conspicua* Druce = *lucania* Schs.

Charidea katima, sp. nov.

♂. Head black and blue. Collar metallic blue. Thorax black with three metallic blue streaks. Abdomen metallic blue. Fore coxæ white; Primaries black shaded with blue at the base, the submedian vein and a broad streak above it red; a broad oblique red band beyond the cell, from the subcostal vein to nearly the outer margin above the angle. Secondaries with the basal half rich metallic blue, the outer half black. Underneath the same without the red basal streaks on the primaries. Expanse, 36 mm.

Habitat: São Paulo, S. E. Brazil.

Eucereon amadis, sp. nov.

Head and thorax dark brown; two minute reddish yellow spots behind the antennæ. Abdomen chrome yellow; black at the base and subdorsally on second segment; a lateral black line; Anus black. Primaries dark brown; the veins, an angular basal line, a small spot in the cell, a transverse outer line forming a large curve beyond the cell and reaching the inner margin about its center, and a terminal row of angular spots yellowish brown; the terminal spots filled in with darker brown. Secondaries semi-hyaline, whitish, the veins and the margins dusky black. Underneath the primaries are black with some vague whitish spots beyond the cell. Expanse, 39 mm.

Habitat: Jalapa, Mexico. Also in coll. British Museum.

Eucereon patrona, sp. nov.

Head, collar and thorax pale brownish gray, with a broad velvety brown lateral streak. Abdomen dorsally crimson with some black hairs subdorsally on the first three segments; laterally a broad black streak; anus black; underneath yellow. Primaries pale brownish gray with some dark but indistinct streaks along the margins forming vague transverse lines, which become lost in a broad velvety brown shade extending from the base to nearly the apex. Secondaries whitish, semi-hyaline, the veins and fringe brownish; the apex and anal angle clouded with brown. Expanse, 43 mm.

Habitat: Aroa, Venezuela; Orizaba, Mexico.

Eucereon velutina, sp. nov

Head and thorax gray; patagiæ brown. Abdomen dorsally with the basal half black, the anal half orange with subdorsal and lateral black spots. Underneath blackish with two yellow stripes. Primaries rich brown, paler at the base of the inner margin; a basal dark line from the costa; a narrow triangular dark space on the outer margin; an outer wavy line almost imperceptible above vein 4, but very dark and becoming broader below it to the inner margin. Secondaries smoky black; the costal margin yellowish; a black point in the cell. Expance, 27 mm.

Habitat: São Paulo, S. E. Brazil.

Eucereon cinctum, sp. nov.

Head black; reddish posteriorly. Thorax smoky brown with some pinkish streaks and a pink subdorsal spot posteriorly. Abdomen black above with a broad crimson space before the anal segment; underneath brownish with two yellow streaks. Primaries smoky black with the veins, a basal, an outer and a submarginal transverse line fawn color; a slight diaphanous spot in the cell and another beyond it. Secondaries hyaline with the outer margin broadly black. Underneath the genus *Erithales* will no doubt sink as a synonym of *Eucereon*, or the latter must be divided into several genera. Of the twenty-nine species I possess I make five groups according to slight differences in neuration.

Amaxia juvenis, sp. nov.

♂. Head yellow above, crimson underneath. Collar yellow. Thorax violaceous brown. Abdomen crimson above, yellow ventrally. Primaries bright yellow; a large violaceous brown space from the costal vein at a third from the base to the inner angle, except the costal margin itself, which remains yellow, and a small yellow spot at the middle of the inner margin, this latter spot being edged with crimson; and there are also some crimson scales at the base of the inner margin; some dark grayish spots in the cell; beyond the cell three transverse rows of spots, the first and outer rows small, the center row also small except towards the outer margin where they become large and confluent and are more or less shaded with crimson; the extremeties of the veins crimson. Secondaries pink; broadly yellowish along the costal margin.

♀. Differs in having the dark basal space broken up into large spots more or less broken up into large spots more or less confluent, and the rows of transverse spots especially the central row, consists of a series of large spots edged with crimson. The thorax is also mottled with yellow. Expanse, ♂ 33 mm., ♀ 42 mm.

Habitat: Jalapa, Mexico.

Amaxia dyuna, sp. nov.

Head yellow posteriorly shaded with crimson. Collar yellow. Thorax dark gray, mottled with yellow and crimson, the patagiæ finely edged with crimson. Abdomen above pink, mottled with yellow at the base; underneath white. Primaries bright yellow; at the base some small grayish spots circled with crimson, and beyond these a large similarly colored and irregular space extending from the subcostal vein to the inner margin, where it reaches the inner angle; two terminal rows of small dark spots; the median yellow space with some small spots and at a fourth from the apex four large and confluent brownish gray spots extending from vein 5 to the costal margin. Secondaries yellowish white, shaded with pink, along the inner margin. Expanse, 36 mm.

Habitat: São Paulo, S. E. Brazil.

Pseudalus, gen. nov.

Antennæ pectinated. Thorax broad. Abdomen slight, short. Primaries broad, outer margin oblique; veins 7-10 stalked; 6 from upper angle of cell. Secondaries broad; veins 3 and 4 nearly from a point at lower angle of cell; veins 5 and 8 absent; 6 and 7 stalked.

Pseudalus limona, sp. nov.

Head and legs orange, the latter spotted with black. Collar and thorax bright yellow. Abdomen whitish. Primaries bright yellow; three black points near the base and an oblique row of black points on the veins from the middle of the submedian nervure to near the apex; a small black mark in the cell. Secondaries white. Expanse, 36 mm.

Habitat: São Paulo, S. E. Brazil.

Idalus citrina Druce is congeneric with this species.

Thalesa, gen. nov.

♂. Antennæ pectinated. Primaries broad, produced along the inner margin apex acute; inner angle rounded. Veins 7, 8, 9 stalked. Secondaries as broad as long; rounded at the apex and inner angle. Veins 5 and 8 absent; discocellular open in the ♂, forming an angle inwardly in the ♀. Vein 7 widely curved above vein 6. Veins 3 and 4 from lower angle of cell.

Allied to *Idalus* and *Eupseudosoma.* Type, *Thalesa* (*Halisidota*) *seruba* H. S. In the ♀ the wings are long and narrow as in *Halisidota.* *Thalesa seruba* is usually confounded with *Halisidota niveigutta* Walk. and the females can only be distinguished by the neuration.

Symphlebia aryllis, sp. nov.

Body orange yellow. Primaries bright yellow; the outer half of the veins brown; the subcostal vein to the end of the cell black, broadly bordered above with creamy yellow, containing a long black streak; a basal creamy yellow space above the submedian vein containing a short fine black streak. Secondaries testaceous Underneath testaceous. Expanse, 64 mm.

Habitat: Aroa, Venezuela.

This species is almost identical with *Lophocampa nervosa* Feld. (Reise Novara, T. 101, Fig. 6.) in its markings, but the neuration is different.

Castrica, gen. nov.

Antennæ finely pectinated. Primaries long and broad, the outer margin slightly produced, between veins 5 and 6; the neuration as in *Symphlebia*, Felder. Secondaries in the ♂ somewhat quadrate with the angles rounded. Vein 2 from

Prumala jamaicensis, sp. nov.

Head and thorax brown. Abdomen red. Primaries above brown; three spots in the cell; an outer and a submarginal row of small indistinct gray spots finely circled with dark brown. Secondaries pink. Underneath the wings are red with a small black spot on the primaries beyond the cell. Expanse, 49 mm.

Habitat: Jamaica, B. W. I.

Nezula, gen. nov.

Antennæ very long, minutely pectinated. Primaries long, narrow, the outer margin very oblique, the inner margin very short. Vein 6 from upper angle of cell; 7,8,9 stalked; 10 and 11 stalked. Secondaries triangular in the ♂ oval in the ♀; veins 3 and 4 stalked; 6 and 7 stalked in the ♀; veins 6 absent in the ♂; vein 5 absent in both sexes.

Nezula grisea, sp. nov.

Head and front of thorax yellow; body otherwise gray. Wings gray, darker in the female than in the male. Expanse, ♂ 21 mm., ♀ 24 mm.

Habitat: Aroa, Venezuela.

Trichromia (*Hübn*) **pandera,** sp. nov.

Head and thorax gray. Abdomen and secondaries bright yellow. Primaries violaceous gray with a very broad yellow space from the middle of the costal margin to the middle of the outer margin, slightly extending towards the apex on the extreme margin, giving the apical gray portion the appearance of a rounded spot. Expanse, 33 mm.

Habitat: Aroa, Venezuela.

This species closely allied to *Neritos repanda* Walk.

Bertholdia, gen. nov.

Antennæ finely ciliate. Body stout. Primaries with the outer margin convex below apex, then oblique. Veins 6–10, usually stalked, 6 sometimes from upper angle of cell. Secondaries triangular with the angles rounded. Veins 3 and 4 from lower angle; 5 from discocellular; 6 absent; 8 from cell following close along vein 7. Underneath on the primaries a ♂ sexual gland between the median and submedian veins near the base.

Named in remembrance of Berthold Neumoegen. Type of genus, *Bertholdia* (*Trichromia*) *specularis* H. S.; *Halesidota trigona* Grote belongs to the same genus. *Trichromia* Hübn., has *onytes* Cr., as type of the genus and *Neritos* Walk., will become a synonym of *Trichromia* Hübn. *Specularis* has little in common with *Zatrephes* where the species has been placed by Mr. Kirby.

Bertholdia albipuncta, sp. nov.

Head brown, palpi white. Collar brown finely edged with white and with a large white central spot. Thorax brown. Abdomen dorsally red; ventrally white; a lateral row of black spots. Primaries above brown minutely specked with black;

a small white spot on the submedian vein at a third from the base; a large subapical vitreous space, on the costal margin, posteriorly shaded with lilacine; the veins crossing this space flecked with dark brown; a whitish marginal line. Secondaries white; at the base pinkish. Underneath the base of the primaries shaded with red. Expanse, 33 mm.

Habitat: Mexico to Brazil.

Easily distinguished from *B. speculatis* H. S. and *B. trigona* Grote by the white spot on the collar and the marginal white line.

Lophocampa andensis, sp. nov.

Head brown; frons whitish. Thorax brown, the collar and patagiæ edged with white. Abdomen brown. Primaries brown flecked with yellowish scales and with four transverse rows of large white spots, the second row bifurcate from the median vein to the costal margin; fringe brown spotted with white. Secondaries white; a brown spot at the apex. Expanse, ♂ 40 mm.

Habitat: U. S. Colombia.

I consider the following species as belonging to the genus *Lophocampa* Harris; *caryæ* Harr., *propinquens* Hy. Edw., *bicolor* Walk., *agassizii* Pack., *maculata* Harr., and *courregesi* Dogn. The following species have two or three costal spurs on the secondaries; *subalpina* French, *albigutta* Bdv., *ambigua* Strk.; *minima* Neum., has veins 3, 4 and 5, on the secondaries from a point; *sobrina* Stretch and *lugens* Hy. Edw have veins 4 and 5 stalked on the secondaries and two costal spurs.

Edwardsi Pack. and *labecula* Grote seem intermediate between *Lophocampa* and *Halisidota*. My observations have reference only to those species which I possess.

Halisidota typical will include *tesselaris* A. & S., with its forms *interlineata* Walk., *cinctipes* Grote and *atra* Druce, also several species described under *Phægoptera*, such as *daraba* Druce, *ergana* Dogn., *aconia* H. S., and *thalassina* H. S. Many of the species placed under *Halisidota* will require new genera, including the following species, which I describe under that genus until I can obtain more material.

Halisidota pulverea, sp. nov.

Body chrome yellow. Primaries chrome yellow thickly covered with dark striæ and specks, confluent in places and forming an indistinct basal and outer line; a submarginal row of blackish points; a large black point at the end of the cell. Secondaries yellow, a small brown submarginal spot between veins 5 and 6. Underneath whitish yellow; some brownish striæ on the costal and outer margins of the primaries. Expanse, ♂ 42 mm.

Habitat: São Paulo, S. E. Brazil.

Belongs to the same group as *strigulosa* Walk., *mandus* H. S., *oruba* Schs.; veins 7–10 on primaries stalked and secondaries with veins 3 and 4 more or less stalked and vein 8 short. *H. strigulosa* varies, the Brazilian specimens agreeing with the neuration of this group, but Mexican specimens have vein 10 from the cell, thus connecting it with the group of *alsus* Cr., *atomaria* Walk., *pectinata* Schs., *catenulata* Hübn and *laroipa* Druce.

Halisidota margona, sp. nov.

Body chrome yellow, the patagiæ inwardly shaded with brown. Primaries acute with outer margin straight and oblique; yellow, the inner margin dark brown; fine wavy brown lines cross the wings, very indistinct at the base; the outer and submarginal lines double, filled in with a slightly darker shade than the ground color, and the submarginal line ceases at vein 5; a terminal row of darker spots edged with brownish between the veins; a dark spot at the end of the cell. Secondaries whitish yellow. Expanse, 52 mm.

Habitat: Jalapa, Mexico.

Allied to *H. strigulosa* Walk.

Halisidota quanta, sp. nov.

Head and thorax chrome yellow, the collar finely edged with brown. Abdomen buff above, whitish underneath. Primaries chrome yellow with transverse darker lunular shades and a broad dark gray streak from the base to just below the apex. Secondaries white. Underneath yellowish white. Expanse, 38 mm.

Habitat: Castro, Parana.

Neuration agrees with Mexican specimens of *H. strigulosa* Walk.

Halisidota rosetta, sp. nov.

Head and collar dark buff; thorax paler. Abdomen pink above; underneath buff with three gray streaks. Primaries yellow with some indistinct fine lunular streaks, especially towards the outer margin; a fine dark brown line along the median nervure to vein 4; a short black streak between veins 5 and 6; a submarginal row of minute dark spots. Secondaries white. Expanse, 43 mm.

Habitat: São Paulo, S. E. Brazil.

Neuration agrees with *H. quanta* Schs.

Halisidota pectina, sp. nov.

Antennæ very deeply pectinated in the ♂. Head and thorax dark buff; two black points on the collar and two on each patagia. Body chrome yellow. Primaries yellow with a broad basal and median transverse grayish shade; a double terminal and subterminal fine dark wavy line, the space within filled with a darker shade; the fringe yellowish with some black spots. Secondaries yellow. Expanse, ♂ 41 mm.

Habitat: Jalapa, Mexico.

Allied to what I have as *alsus* Cr., though I am doubtful about the identification, having no Surinam specimens and Cramer's figure being rather poor.

Halisidota thyophora, sp. nov.

Body yellowish buff; two minute dark points on the collar. Primaries pale yellow, somewhat diaphanous, the costal and inner margin yellower; three basal, two median, three outer and three terminal, fine, irregular transverse lines, the median and outer lines becoming confluent on the inner margin; on the costal margin some black points indicate the lines and there is a submarginal black point between veins 5 and 6; some dark points on the fringe. Secondaries yellowish white. Expanse, 38 mm.

Habitat: Aroa, Venezuela.

I have used a Mss. name of Moritz on a specimen in the Saunders collection at Oxford. This species is allied to *H. ænone* Butl., with which it agrees in neuration. Both are allied to *texta* H. S. in neuration, but vein 8 is sometimes present as a short spur on the secondaries, whereas all my specimens of *texta* are without it.

Euhalisidota sablona, sp. nov.

♀ Body fawn color. Primaries fawn color with some buff spots at the base, along the costa, in the cell and a subterminal row; a few minute black scales scattered over the wing. Secondaries pale buff, the outer margin broadly and irregularly powdered with dark scales. Expanse, 58 mm.

Habitat: São Paulo, S. E. Brazil.

Phægoptera nexoides, sp. nov.

Differs from *P. nexa* H. S., in the greater extension of the brown on the primaries, leaving only a basal white spot, a faint white median shade and a subterminal white band. The collar has no white spots, but the patagiæ are broadly bordered with white dorsally. The secondaries are yellowish white with the veins and a narrow marginal shade dark gray. Expanse, 55 mm.

Habitat: São Paulo, S. E. Brazil.

Phægoptera chorima, sp. nov.

Head and thorax black; the collar posteriorly reddish; a dorsal red spot on streak. Thorax reddish, broadly brown subdorsally; patagiæ brown with a broad white streak. Abdomen red above with a subdorsal black streak; some transverse black streaks posteriorly; a row of black spots laterally; underneath black with two white streaks. Primaries black; a broad white curved band from the base of the costal margin to the apex; two small white marginal spots between veins 2 and 3, and 3 and 4. Secondaries dull blackish brown; a broad white streak at the base and some white spots near the apex. Expanse, 40 mm.

Habitat: São Paulo, S. E. Brazil.

Phægoptera ? aurogutta, sp. nov.

Palpi, head, and thorax black, the latter with a large crimson tuft posteriorly. Abdomen black with some yellow transverse lines posteriorly. Primaries greyish black with golden yellow spots; six on the costa; three in the cell, and two at the end of the cell; one between veins 7 and 8; two between veins 6 and 7; the same between 5 and 6, 6 and 4, and 4 and 3; three between veins 2 and 3; eight between the median and submedian; one on the inner margin near the angle; eight spots on the fringe. Secondaries light brown; a dark spot in the cell; the apex black, and some diffuse blackish shades along the outer margin; the fringe yellow. Expanse, 40 mm.

Habitat: U. S. Colombia.

Mazæras francki, sp. nov.

Head and collar dark red, the latter with two black points. Thorax dark reddish brown. Abdomen red at the base, otherwise yellow above with a subdorsal and a lateral row of large black spots. Primaries above dark reddish brown with a pink spot on the inner margin at the base. Secondaries pinkish white, the veins, fringe and inner margin broadly pink. Underneath the disc and inner margin of the primaries pink. Expanse, 60 mm.

Habitat: São Paulo, S. E. Brazil.

Allied to *M. conferta* Walk.

Mazæras rusca, sp. nov.

Head and thorax vermilion red, the patagiæ with two brownish streaks. Abdomen yellow with a dorsal and a lateral row of small black spots. Primaries vermilion red, the veins gray; fine grayish striæ form an indistinct outer and a subterminal band. Secondaries pink with the disc yellowish white. Underneath the primaries are red; the apex and outer margin brownish. Expanse, 44 mm.

Habitat: São Paulo, S. E. Brazil.

Chætoloma dissimilis, sp. nov.

Palpi black. Head and thorax buff. Abdomen orange with a large dorsal spot of dark metallic blue. ♂. Primaries hyaline, the costal and inner margins buff, the former with three blue black marks, the latter with a dark upright line beyond the center. Secondaries hyaline, the costal and inner margins orange.

♀. Primaries yellowish brown, darkest on the inner and outer margins; two small black marks on the costa and a line on the inner margin as in the male and reaching vein 2. Secondaries orange with a broad blue black mark from the anal angle to vein 3. Expanse, ♂ 41 mm., ♀ 55 mm.

Habitat: U. S. Colombia.

Apparently allied to *Chætoloma actinobola* Feld.

Palustra sericea, sp. nov.

Head, thorax, and abdomen underneath brown; abdomen above chrome yellow Primaries brown. Secondaries grayish brown, whitish at the base. Underneath the base of the costal margin chrome yellow, the disc towards the base whitish. Expanse. ♀ 53 mm.

Habitat: Castro, Parana.

Motada dukinfieldia, sp. nov.

Head and thorax brownish gray. Abdomen yellowish above with a subdorsal row of black spots; underneath brown with transverse yellow bands. Wings brownish gray, all the veins broadly creamy yellow; the fringe creamy yellow. Expanse, ♀ 60 mm.

Habitat: Castro, Parana.

Motada bergi, sp, nov.

Head and thorax brown. Abdomen brown with a broad lateral yellowish band. Wings brown, the veins on the primaries distinctly paler; the discocellulars darker. Expanse, ♂ 37 mm., ♀ 42 mm.

Habitat: Castro, Parana.

Motada honora, sp. nov.

Head and thorax dark brown, the patagiæ with some golden hairs. Abdomen, above and anus golden yellow with some indistinct narrow, black, transverse bands; Underneath darker brown. Primaries rich brown with the veins darker. Secondaries light brown with some golden hairs at the base. Expanse, ♀ 40 mm.

Habitat: Castro, Parana.

Motada paula, sp. nov.

Motada variegata, sp. nov.

Head black. Collar yellow. Abdomen black with a pale lateral band. Primaries dark brown, the veins on the outer half finely white; two small white spots in the cell connected by a blackish streak, a large round black spot at the end of the cell; some irregular white markings on the inner margin; a fine, indistinct and interrupted whitish outer line; a submarginal wavy white shade. Secondaries white; a dark spot in the cell; some irregular dark blotches along the outer margin. Expanse, 43 mm.

Habitat: São Paulo, S. E. Brazil.

Some specimens of this species are very much darker.

Titya lanuginosa, sp. nov.

Body of grayish brown; the anal segment silvery gray. Wings grayish brown; the primaries with a basal dark shade from the costa to the submedian; a velvety black spot in the cell; an outer wavy transverse dark shade, outwardly bordered with paler gray. Expanse, ♀ 67 mm.

Habitat: São Paulo, S. E. Brazil.

Hydrias amaryllis, sp. nov.

Body bright yellow. Wings bright yellow, the veins darker on the yellow portion; two broad transverse straight gray bands, edged on either side with white, the basal band indistinct on the secondaries; the outer band from near the apex of the primaries to the anal angle of the secondaries. Expanse, ♂ 37 mm.

Habitat: Castro, Parana.

Hydrias vitripuncta, sp. nov.

Body reddish brown. Primaries reddish brown, the basal half darker, limited by a fine pale line, oblique from the costa, then curving inwardly towards the inner margin; a subterminal row of whitish lunular marks; a terminal yellowish line; on the fringe grayish lunules. Secondaries reddish brown; a submarginal row of whitish hyaline spots, the third from the apex being the largest and is placed just beyond the cell. Expanse, ♂ 30 mm.

Habitat: Aroa, Venezuela.

Hydrias marna, sp. nov.

Head and thorax violaceous gray. Abdomen lilacine brown. Primaries fawn color thickly speckled with dark brown scales; the base, inner margin and half of the outer margin above the inner angle, lilacine gray; an outer yellowish transverse line; the apical portion of the outer margin whitish; a subterminal row of fawn color quadrate spots; the extreme margin fawn color. Secondaries reddish brown; the costal margin paler with dark specks: a transverse median and a subterminal whitish line. Expanse, 28 mm.

Habitat: São Paulo, S. E. Brazil.

Hydrias venalia, sp. nov.

Body fawn color. Primaries reddish fawn color, darker at the base and limited by a double irregular dark gray line; a small dark gray spot on the costa at the base;

a black point in the cell; an outer wavy gray line exteriorly shaded with white followed by an indistinct grayish line; a subterminal row of gray spots. Secondaries white; the costal margin reddish fawn color with the commencement of transverse gray lines. Expanse, 29 mm.

Habitat: Aroa, Venezuela.

Hydrias chera, sp. nov.

Body brownish gray. Primaries brownish gray, dark at the base; a brown point in the cell; an outer, wavy dark gray line; a subterminal irregular dark line; the lines heaviest on the costal margin. Secondaries brown; the costa and apex broadly gray; a median and a submarginal wavy dark line. Expanse, ♂ 41 mm.

Habitat: São Paulo, S. E. Brazil.

Hydrias funerea, sp. nov.

Head and thorax dark gray speckled with white; abdomen brown. Primaries and costal margin of secondaries finely and thickly mottled gray and dark brown; an indistinct trace of a basal, median, outer and subterminal dark transverse shade, secondaries otherwise brown. Wings underneath brown. Expanse, 47 mm.

Habitat: São Paulo, S. E. Brazil.

Hydrias mediana, sp. nov.

Head and thorax grayish. Abdomen brown. Primaries brown, the median space whitish limited on either side by a grayish shade; a small dark spot at the base; a subterminal dark wavy line. Secondaries brown; the costal margin broadly whitish with traces of a median and subterminal dark shade. Expanse, 31 mm.

Habitat: Rio Janeiro.

Hydrias chamicuros, sp. nov.

Body and wings brown; on the primaries a large white spot on the middle of the costal margin, and a similar spot on the inner margin; an indistinct outer and terminal dark shade. Secondaries with the trace of three broad white lines on the half of the costal margin. Expanse, 27 mm.

apex and middle of the outer margin; fringe spotted with brown. Secondaries creamy yellow; some brownish shades on the costal margin. Expanse, 23 mm.

Habitat: São Paulo, S. E. Brazil.

Macromphalia arpia, sp. nov.

♂. Body brown. Primaries brown, the outer half indistinctly shaded with gray; a dark brown spot in the cell. Secondaries grayish brown, with a darker median line and indistinct broad submarginal shade.

♀. Anal segment dark silky gray. The wings uniform brown with a dark spot in the cell on the primaries. Expanse, ♂ 31 mm., ♀ 52 mm.

Habitat: Buenos Ayres.

Artace manoba, sp. nov.

Head, and patagiæ white; thorax and abdomen gray with long white hairs at the base of the latter. Primaries white; a broad gray shade from the middle of the inner margin to the apex, where it is cut by a white line; the extreme outer margin finely gray. Secondaries white, the extreme margin gray. Expanse, 30 mm.

Habitat: Aroa, Venezuela.

◆

DESCRIPTIONS OF TWO NOCTUID LARVÆ.

BY HARRISON G. DYAR.

Spargaloma sexpunctata *Grote.*

Head small, pale yellowish testaceous, ocelli black; width, 1.8 mm. Body slender, cylindrical, green; feet all about alike, the anal pair divergent. Tubercles concolorous setæ moderately long, single, white, normal in arrangement for the Noctuidæ, iii rather close to the spiracle, iv substigmatal, posterior; three setæ on the leg plate. The larva is without marks, though the tracheal line may be seen with a lens. The last three stages were observed with widths of head .8, 1.15 and 1.8 mm.

Resembles the larva of *Sarrothripa*, but the setæ are shorter and it spins no web. Solitary on the Dogbane (*Apocynum*).

Deva purpurigera *Walker.*

Head small, green with black ocelli; width, 1.5 mm. Body slightly enlarged on joints 5, 6, 7 and 12; tubercles low rounded cones on the prominent segments, the segmental incisures deep, the segments rounded, so that the larva appears more humped and angled than is actually the case. Color translucent green, not yellowish, marked with bright opaque white, in the semblance of oblique transverse bands. On the thorax the white stigmatal band is still intact, though cut down at the incisures; behind on the abdomen it is cut through at these points and produced subventrally; the subdorsal band is obliquely divided between tubercles i and ii, the hinder portion joining the stigmatal white patch centrally on each segment. The bands unite confusedly with a narrow geminate dorsal line. Feet only present on joints, 9, 10 and 13, reddish tipped; thoracic feet green. Tubercles normal for the Noctuidæ, iii, especially on joints 5 and 6, shining black. It was regarded at first as the egg of a parasite, till it was noticed that it was alike on both sides. Tubercle vii consists of three rather distant setæ on joints 5 to 8. Length about 30 mm.

Solitary on Meadow-Rue (*Thalictrum*), towards the end of May. Green and white, curiously hunched up.

DESCRIPTION OF A NEW MOTH.

BY WILLIAM BEUTENMÜLLER.

Ottolenguia, gen. nov.

Primaries.—Vein 1 free; median four-branched; veins 6–10 all simple, unbranched; veins 11 from the subcostal near the middle of the cell; vein 12 from base.

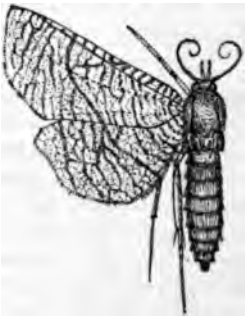
Secondaries.—Two internal veins; median vein four-branched; veins 6–7 from apex of cell; vein 8 from base, sinuate and close to 7 at the outer part of the cell. A distinct frenulum hooked into a loop on the subcostal vein of the primaries.

Antennæ strongly pectinated in the male, simple in the female; palpi from 2 to 3 mm. long, with short scales; eyes rather large, naked; tongue very short. Body long and slender, extending much beyond the hind wings. Fore wings elongated, much longer than broad; costa somewhat sinuate at the middle in the male, apex acute; hind angles obliquely rounded; outer margin entire. Hind wings extending to the hind angle of the fore wings, outer margin sinuate above the middle, apex acute, hind angle rounded, costa somewhat sinuate at the middle. Legs slender, closely scaled; middle tibiæ with one pair of spurs; hind tibiæ with two pairs.

Ottolenguia reticulina, sp. nov.

Wings above and below pale cinnamon brown, with numerous fine reticulations of a darker color, and with transverse irregularly angled lines. The line on the middle of the fore wing is bifurcate from the end of the cell to the costa. Head, thorax, abdomen and legs pale cinnamon brown. Expanse, ♂ 25 mm.; ♀ 33 mm.

Habitat: Flamingo, Florida (Coll. R. Ottolengui); Riverside, California (Coll. A. Bolter).



An example of this species from Florida was in Hy. Edward's collection for a number of years awaiting identification. Mr. Edwards did not describe the specimen, not knowing where to place it generically. The insect was also seen by a number of well-known Lepidopterists who likewise were unable to recognize it, or place it generically. This specimen unfortunately got broken beyond repair.

In looking over Dr. R. Ottolengui's collection recently I discovered a female of the same species, and another male specimen was sent to Mr. Dyar by Mr. Bolter for naming. The species is certainly a very perplexing one, as regards its position in classification. It does not seem to fit in any of the families of Lepidoptera, except the Thyrididæ near the Indian genus *Herdonia* (see Hampson, Moths of India, Vol. I, p. 367, fig. 248). I am under obligation to Mr. Dyar for a study of the venation of the genus. The figure is twice natural size.

JOURNAL

OF THE

New York Entomological Society.

Vol. IV. DECEMBER, 1896. No. 4.

NEW SPECIES OF HETEROCERA FROM TROPICAL AMERICA.

By W. Schaus.

CASTNIIDÆ.

Castnia gramivora, sp. nov.

Body light brown above, whitish underneath; the patagiæ iridescent olivaceous green. Primaries light brown, somewhat olivaceous at the base and along the inner margin; on the outer half of the wing a large semi-diaphanous space, not reaching the margins and crossed by brown veins, also interrupted anteriorly by a large brown spot extending from the costal margin. Secondaries brown, reddish at the base; a terminal row of reddish brown spots on the outer margin, preceded by a large semi-diaphanous space. Underneath the wings are much paler. Expanse, 64 mm.

Habitat: São Paulo, S. E. Brazil.

This species was discovered by E. D. Jones, Esq., who tells me that it is found flying in the grasses after the manner of certain Noctuidæ.

Castnia corrupta, sp. nov.

Entirely dark brown, changing to dark metallic green in certain lights; the anus orange red. At the anal angle of the secondaries a red spot adjoining some creamy white clusters of scales which extend towards the center of the wing. Underneath the wings are powdered with reddish scales, forming an indistinct terminal band on the primaries and two more distinct bands on the secondaries. Expanse, 110 mm.

Habitat: Colombia.

Castnia veraguana *Wtw.*

Castnia veraguana Westwood, Trans. Linn. Soc. London, Ser. 2, Zool. I, p. 168, pl. 30, fig. 1; Druce, Biol. Centr. Amer. Het. p. 24, pl. 14, fig. 4.

I have recently obtained what I believe to be the ♂ of the above species. The primaries agree very well with the type figured, only the subapical white spots are more oblique in my specimens. The secondaries differ in being velvety black with a marginal row of large red spots extending on to the fringe. Expanse, 108–130 mm.

Habitat: Colombia.

Should my description refer to a new species then I propose for it the name of *C. govara.*

AGARISTIDÆ.

Arpia, gen. nov.

Palpi short, porrect, pubescent. Antennæ long, filiform. Primaries straight on the costal margin and inner margin; the outer margin oblique in the ♂, slightly convex in the ♀; vein 6 from upper angle of cell; veins 7, 8, 9, from a point at end of small areolet. Secondaries with the neuration as in *Copidyras,* from which this genus differs chiefly in the arrangement of veins 7, 8, 9, on the primaries.

Arpia janeira, sp. nov.

Head, thorax, and abdomen dark grey; patagiæ reddish brown. Primaries with the costa broadly greyish fawn color, separated from the outer and posterior portion of the wing, which is dark brown, by a fine white line which starts from the costa near the apex, descends obliquely below vein 4, curves upwards into the end of the cell, again descends obliquely, nearly touching a large dark brown spot, oval in shape, which occupies the base of the inner margin, and then recedes to the inner margin near the angle. Secondaries yellow with a broad black margin. Underneath yellow; the secondaries margined with dark brown; the primaries with the costa narrowly, the apex broadly brown, and a transverse broad brown band from the costa to the inner margin near the angle. Expanse, 42 mm.

Habitat: Rio Janeiro.

Phasis meridiana, sp. nov.

Head and thorax black. Abdomen yellow with a subdorsal and a lateral yellow line. Primaries black with a creamy yellow oblique band beyond the cell from the subcostal to vein 2. Secondaries bright yellow with all the margins very broadly black, limiting the yellow to a very small space. Underneath the yellow band on the primaries is wider. Expanse, 48 mm.

Habitat: Rio Paranapanema, S. Brazil.

LITHOSIIDÆ.

Talara grisea, sp. nov.

Head and thorax grey; abdomen red. Primaries dark grey. Secondaries white; the apex and outer margin greyish. Underneath the same. Expanse, 18 mm.

Habitat: São Paulo, S. E. Brazil.

Talara ruficollis, sp. nov.

Head and body greyish black, collar reddish. Primaries greyish black. Secondaries dull black. Expanse 18 mm.

Habitat: São Paulo, S. E. Brazil.

Talara domina, sp. nov.

Head and thorax dark grey. Collar and abdomen red. Primaries dark grey. Secondaries brownish grey. Expanse, 17 mm.

Habitat: São Paulo, S. E. Brazil.

Talara barema, sp. nov.

Head and thorax light grey. Abdomen pale yellow. Primaries light grey speckled with brown scales; a cluster of dark scales about the middle of the wing. Secondaries pale yellow. Underneath pale yellow, the disc and costa of the primaries brownish. Expanse, 16 mm.

Habitat: São Paulo, S. E. Brazil.

Talara obscura, sp. nov.

Body black. Primaries glossy black with a faint greenish tinge. Secondaries dark brown. Expanse, 17 mm.

Habitat: São Paulo, Rio Janeiro.

Talara bombycia, sp. nov.

Body greyish brown. Primaries light grey, shaded with brown at the base, along the costa and on the outer margin near the apex and inner angle; a dentate white line crosses the wing at a third from the base, and there is a curved white line beyond the cell from the costal to the inner margin. Secondaries smoky brown. Expanse, 17 mm.

Habitat: São Paulo, S. E. Brazil.

Odozana varda, sp. nov.

Head and thorax blackish. Abdomen red. Primaries dark brown glossed with violet. Secondaries with the base red to the anal angle; the apical portion and outer margin black. Expanse, 20 mm.

Habitat: São Paulo, S. E. Brazil.

Odozana olivacea, sp. nov.

Head and thorax brownish green. Collar yellow. Abdomen red. Primaries glossy, olivaceous green. Secondaries red; the costal and outer margins narrowly black, the apex broadly black. Underneath the primaries are black. Expanse, 20 mm.

Habitat: São Paulo, S. E. Brazil.

Odozana pascuala, sp. nov.

Head and thorax brownish grey. Collar yellow. Abdomen orange red. Primaries brownish grey. Secondaries crimson, the costal margin yellowish, the outer margin black, the median vein black. Underneath primaries black, the costal half at the base red. Secondaries orange with black outer margin. Expanse, 18 mm.

Habitat: São Paulo, S. E. Brazil.

Odozana cuprea, sp. nov.

Head black. Thorax coppery brown. Abdomen with the basal half fawn color, the anal half red. Primaries coppery brown. Secondaries pale reddish yellow, a large brownish space at the apex. Expanse, 22 mm.

Habitat: São Paulo, S. E. Brazil.

Odozana margina, sp. nov.

Head and thorax grey. Collar and patagiæ dorsally red. Abdomen red. Primaries glossy brown, the inner margin yellow. Secondaries red, the outer margin black. Expanse, 16 mm.

Habitat: São Paulo, S. E. Brazil.

Nodoza, gen. nov.

Differs from *Odozana* in having the ♂ antennæ deeply pectinated and the anal angle of the secondaries much prolonged.

Nodoza tristis, sp. nov.

Head, thorax and primaries chocolate brown. Abdomen blackish. Secondaries brown, slightly hyaline at the base; a dark spot at the end of the cell. Expanse, 22 mm.

Habitat: São Paulo, S. E. Brazil.

Zonoda, gen. nov.

Allied to *Odozana*, but the ♂ has a large tuft of hairs on the inner margin of the primaries underneath, and the secondaries have very long tufts of hairs on the inner margin, which is cleft and very prolonged.

Trichomelia placida, sp. nov.

Body dark grey. Primaries pale grey, all the veins finely dark. A quadrate dark spot in the cell and an outer transverse dark irregular line. Secondaries pale grey. Expanse, 22 mm.

Habitat: Castro Parana.

Allied to *T. celenna* Schs., but the secondaries much paler and the markings on the primaries different.

Trichomelia parima, sp. nov.

Dark smoky grey, the veins on the primaries finely brown; an indistinct median shade on the primaries widest on the inner margin. Expanse, 25 mm.

Habitat: São Paulo, S. E. Brazil.

Illice subfulgens, sp. nov.

Head and thorax creamy yellow. Abdomen grey. Primaries light brown iridescent; the inner margin, half of the outer margin above the angle, and a broad median shade creamy white. Secondaries grey whitish at the base. Underneath dark grey, the base of the secondaries white. Expanse, 28 mm.

Habitat: São Paulo, S. E. Brazil.

Lithosia sadima, sp. nov.

Body grey. Primaries above light silky grey, the costal margin faintly yellowish. Secondaries grey, fawn color at the base and broadly along the inner margin. Underneath blackish grey, the inner half of the secondaries fawn color. Expanse, 28 mm.

Habitat: Castro Parana.

Crambidia parvita, sp. nov.

Entirely pure dull white. Expanse, 18 mm.

Habitat: São Paulo, S. E. Brazil.

NOLINÆ.

Calligenia marmorata, sp. nov.

Head and collar white. Thorax and abdomen fawn color. Primaries white; a transverse brown line at the base, then a lunular steel grey spot connected with the costal margin by a brown spot; a third brown spot from the costal margin to the cell; on the inner margin a large oval brown spot anteriorly shaded with grey; two brown blotches above the outer portion of the oval spot and between it and the costal margin; a subterminal brown band and a minute brown spot on the apex. Secondaries white, with a narrow brown outer margin. Expanse, 17 mm.

Habitat: Castro Parana.

Calligenia erminea, sp. nov.

Body white. Primaries white; an indistinct brownish median line; four minute dark spots on the costa; from the inner angle to below the apex on the outer margin a lunate spot, mottled grey and white; on the extreme outer margin some minute brown spots. Secondaries white, the outer margin black. Underneath white; on the primaries a broad subterminal blackish shade, projecting about its center to the outer margin; the costa smoky. Secondaries with a black outer margin. Expanse, 14 mm.

Habitat: São Paulo, S. E. Brazil.

Nola panthera, sp. nov.

Head and thorax white. Abdomen grey. Primaries white with four rows of small black spots; a black spot in the cell between rows 2 and 3, and another between rows 3 and 4. Three submarginal spots, one on the costa, one near the inner angle and another about the middle of the outer margin; a terminal row of black points. Secondaries whitish, slightly grey along the outer margin. Expanse, 20 mm.

Habitat: São Paulo, S. E. Brazil.

Nola hermana, sp. nov.

Head brown. Collar grey edged with brown. Abdomen grey. Primaries grey; a large triangular brown space occupying the basal half of the costal margin; a double outer fine black line, forming a prolonged curve at veins 3 and 4; the grey portion of the wing minutely speckled with brown. Secondaries pale brownish grey. Expanse, ♀ 23 mm.

Habitat: São Paulo, S. E. Brazil.

Allied to *N. terulosa* Druce.

Nola rodea, sp. nov.

Head and thorax grey. Abdomen pale brown. Primaries grey; a brown spot on the costa at the base and a broad median brown shade from the costa to the inner margin; a fine blackish basal and outer line; a subterminal dark grey shade and some minute brown terminal spots. Secondaries whitish, the apex broadly grey. Expanse, 22 mm.

Habitat: São Paulo, S. E. Brazil.

Nola garuba, sp. nov.

Head and thorax light grey. Abdomen pale brown. Primaries whitish; on the costa, a basal and a median dark brown spot; a fine dark curved outer line, most yellowish scales; the costa also speckled with black and dark green scales; near the base of the cell a large cluster of greenish black scales and an oblique mark of similar scales from the costa subapically; the apex whitish; two round tufts of raised scales in the cell; a faint submarginal brownish shade. Secondaries greyish brown; a minute spot in the cell. Expanse, 22 mm.

Habitat: São Paulo, S. E. Brazil.

Nola natama, sp. nov.

Head and thorax white. Abdomen cream color. Primaries white on the basal half and at the apex; some olive shadings along the costa; the outer line formed of minute clusters of velvety black scales, heavily shaded on either side with brown and yellowish scales. Secondaries dark grey. Expanse, 18 mm.

Habitat: São Paulo, S. E. Brazil.

Nola solvita, sp. nov.

Body dark grey. Primaries whitish grey, thickly speckled with brown and black scales, giving the wings a dark appearance; an indistinct basal and outer line; a faint median shade and another, subterminal; fringe brown. Secondaries smoky grey. Expanse, 17 mm.

Habitat: Castro Parana.

LYMANTRIIDÆ.

Orgyia falcata, sp. nov.

Body grey. Primaries with the basal third brownish grey, limited by a wavy dark brown line and crossed at the base by a similar line which does not reach the inner margin; the rest of the wing grey with a curved lunular line beyond the cell enclosing toward the costal margin, a large smoky space; at the end of the cell a small brownish spot, a subterminal brown shade streaked with dark brown near the apex; a terminal brown line; fringe pale at the base, dark terminally. Secondaries brownish grey with the fringe as on the primaries. Expanse, 28 mm.

Habitat: Jalapa, Mexico.

This species is allied to *O. leucostigma* S. & A., but the primaries are somewhat produced at the apex.

CYLLOPODIDÆ.

Rhosus unipuncta, sp. nov.

Body dark brown, anus orange. Primaries very dark velvety brown, thinly speckled with greyish scales; a large oblique white spot beyond the cell; fringe light brown. Secondaries dark brown, fringe mottled white and brown. Underneath dark brown, the primaries with a white discal spot and the apex narrowly white; secondaries with two white lines from the base, fringe white. Expanse, 37 mm.

Habitat: São Paulo, S. E. Brazil.

Scotura nervosa, sp. nov.

Head orange; body grey. Primaries grey, all the veins whitish. Secondaries white with all the margins broadly steel grey. Expanse, 30 mm.

Habitat: Aroa, Venezuela.

Allied to *Scotura venata* Butl.

Ephialtias tryma, sp. nov.

Body black above; abdomen underneath white. Legs black above, white underneath. Wings black; on the primaries a broad oblique yellow band on the outer half from the subcostal to the submedian vein. Expanse, 26 mm.

Habitat: Trinidad, B. W. I.

CERATOCAMPIDÆ.

Eacles masoni, sp. nov

Head and collar yellow. Thorax reddish brown. Body yellow, somewhat reddish subdorsally. Primaries yellow, so thickly covered with reddish brown scales and still darker transverse striæ, that the yellow is only conspicuous at the apex on the costal margin, and near the inner angle on the outer side of the subterminal line, which is dark, straight and rather closer to the outer margin than in the other described species; the basal line is broad, slightly wavy and hardly apparent in the general dark tone of the wing; in the cell two indistinct dark spots; the outer margin at its center suffused with lilacine scales. Secondaries yellow; a large reddish brown space along the inner margin at the base; the discal spot reddish brown with some central whitish scales; a straight transverse dark line from the apex to the inner margin at two thirds from the base; this line outwardly bordered with yellow chiefly towards the angle; the outer margin otherwise dark reddish brown. Expanse, ♂ 118 mm.

Habitat: Orizaba, Mexico.

It affords me great pleasure to name this fine species after my good friend, J. T. Mason, Esq., of Denver, Colorado, whose discovery of *E. imperialis*, var. *nobilis* was not recognized by Mr. Neumoegen when describing it. I may here mention that I captured in April at Orizaba

NOTES ON THE TRANSFORMATIONS OF THE HIGHER HYMENOPTERA.—I.

BY A. S. PACKARD.

The following descriptions of the larval and pupal stages of some of our more common Hymenoptera belonging to the fossorial families, together with the wasps and bees, were drawn up over twenty years ago and were preserved in the hope of adding others. But lack of time and material has prevented such additions and what few notes have been gathered are now offered for publication. The descriptions are, so far as possible, comparative, as this is especially needful in the case of larvæ whose mode of life is so similar, and which therefore present very slightly marked specific as well as generic characters. In no group of animals, perhaps, are there such slight larval characteristics as in those of the Hymenoptera, the phytophagous forms being excepted. This is evidently due to their living confined in closed cells, to their lack of the necessity or power of locomotion, and to the fact that immediately after birth they can feed on food, whether vegetable, such as pollen, or the bodies of other insects or spiders stored up for them by the prevision of their parents. They live in total darkness, hence are eyeless; they have no enemies to shun, hence have no defensive spines or armature of any kind. The reduction in the limbs and mouth-parts, and the lack of any differentiation in form, ornamentation, or color of the integument; even the undeveloped proctodæum, all tend to prove that the larval forms of these Hymenoptera are due to modifications from simple disuse, for their embryology shows that they have descended from insects whose larval forms were out-of-door feeders, probably like those of the saw-flies, and provided like them with abdominal as well as thoracic legs.

It is to be hoped that our entomologists will hereafter pay more attention to the habits of our wasps and bees, for the wonderful differentiation of the bodies of the adults is correlated with their varied and striking modes of life and their high degree of intelligence.

Pompilus funereus *St. Farg.*

Larva.—This larva is with some hesitation referred to the above species, but it belongs to a common New England species. The head is round, scarcely longer than broad; the surface of the front not very convex, being much shorter and broader than in *Polistes*. Eyes on the front edge, with a long oblique testaceous line, a little angulated opposite the base of the clypeus. Antennal tubercle situated on the outer edge of a round area opposite the base of the clypeus; supra-clypeal piece obtuse, the suture separating it from the epicranium indistinct. Clypeus transverse, half as long as broad; the sides very oblique, marked by testaceous oblique lines; front edge straight. Labrum broad, being one-third as long as broad; thin, flat, bilobate, overlapping the mandibles, but so thin and expanded that they can be seen through. Mandibles unusually short, stout, thick and broad, not much longer than broad, unidentate, the outer edge produced into a short obtuse point; within curved towards the retreating inner edge. Maxillæ smaller and slenderer than usual, ending in the maxillary palpi, which are short papillæ. Labium as usual, with two papilliform palpi, between which is the rudiment of the lingua, forming a transverse chitinous line. In my two alcoholic specimens the head is bent upon the breast, nearly reaching the middle of the body. The body is very short and broad, dilating in the middle. The end is unusually acute, the lateral region is more prominent, convex and tuberculated than any of the genera of other allied families; much more so than in *Odynerus*. The segments are unusually short, dorsally thickened posteriorly, giving a serrate appearance to the outline of the body, the tip sternally is much exserted and of the same size with the tergite; the two forming a terminal rounded knob.

In its round flattened head bent forward and under the body, the broad transverse clypeus and broad short bilobate thin transparent labrum, and especially the one-toothed, short, broad mandible which differs entirely in form from the other genera previously noticed, we probably have mostly family characters separating the Pompilidæ from testaceous or chitinous line, opposite and just within the lower end of which are situated the antennal rudiments, situated in a round depression. Supraclypeal piece obscurely marked at the base. Clypeus subtrapezoidal, angular in the middle on each side; twice as broad as long; base and front edge transverse, the front edge slightly concave, exserted so as partially to envelop the base of the mandibles. Labrum very free, exserted and overlapping the mandibles; more than twice as broad as long, bilobate, the corners rounded, the front edge excavated; thin, translucent. Mandibles short, twice as long as broad at base, tridentate, the mesial tooth largest, the inner smallest. Maxillæ rather long and slender. Rudiments of the palpi acute, longer and more pointed than usual. Labium a little wider than usual, the rudiments of the labial palpi acute. Body long cylindrical, the segments of uniform size and shape, not thickened much behind, but still as much so as in the larva of *Megachile*, for instance, and in this respect very different from Crabronid and Pompilid larvæ. The pleural region is not prominent. The body is very cylindrical; the tip broad obtuse, the terminal tergites and sternites broad and flat, together forming an orbicular area, very different from the exserted prominent knob-like ending of the larva of *Pompilus*.

It differs from the larva of *Pompilus* in the short curvilinear testaceous line, in the short broadly trapezoidal clypeus and the distinct exserted labrum. The mandibles differ from those of *Pompilus* in being tridentate and twice as long. The front edges of the segments are thickened, but not so convex as in *Pompilus*, giving a serrate appearance to the body. Tip rounded, full, not nearly so acute as in *Pompilus*. The larvæ of the two genera differ greatly; indeed, more than one would suspect, considering that they are representatives of two allied families.

Pelopæus cementarius (*Drury*) (**flavipes** *Fabr.*).

Pupa.—The pupa of *Pelopæus* differs from that of *Polistes* and *Vespa* in the head being raised more from the pectus. The palpi are visible along their whole length. The legs are much longer, and the pedicel is of the same shape as in the adult. The head is much as in the imago. The mandibles long, slender, curved, covering the base of the maxillæ and lingua. The scape of the antennæ is oblique; the flagellum reaches to the posterior coxæ, resting between the two anterior pairs. The maxillæ are slender, not reaching to the entire labium. Of the rhabdites or blades of the ovipositor, only one pair is visible; the inner ones are enveloped by the outer pair, which are united into one piece in *Polistes;* above, a small inner pair lies between, slenderer than those beneath. The edges of the abdominal segments are a little more thickened than usual, and slightly spinulose; on the side is a prominent long slender tubercle.

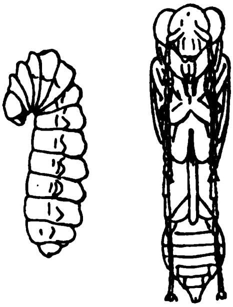


Fig. 1. Larva and pupa of *Pelopæus cementarius.* (Trouvelot del.)

Sphex tibialis St. Farg.

Larva.—The body of the living larva is somewhat flask-shaped, slightly flattened, gradually widening from the head towards the posterior fifth of the body. The head is small and not prominent. There are 13 segments behind the head; the pleural or lateral ridges are rathe prominent, those of each segment well defined, the posterior half o each segment much thickened, giving a crenulate outline to the tergum the last segment is full, orbicular, the end of the abdomen being full-

acutely so, so that dorsally there are subacute extensions of the thickened posterior portion. The terminal segments cylindrical, less convex, the terminal or tenth ring cylindrical, not flattened, large and full. Beneath, the rings are very convex. The pleural region not very distinctly marked. Color a beautiful roseate tint. Head long and as narrow as usual, though no more so; full and convex; supra-clypeal piece large, subtriangular, indistinctly marked. Antennal fossa rudimentary; placed rather farther back, or rather the clypeus is so much shorter than usual as to give it the appearance of being situated farther back. Clypeus short and broad, transversely oblong, base convex, front edge a little concave, as broad as the base; the sides parallel, acutely convex. Labrum large chitinous, transparent, as broad as the clypeus, bilobate, with a distinct median line. Mandibles rather slender, long, incurved, very acute. Maxillæ cylindrical, 2-jointed, tip or rudiment of the palpi minute. Labium much as usual, flattened, cylindrical, ending in a transverse chitinous line, being the rudiment of the lingua? on each side of which are the minute rudiments of the palpi.

Described from living specimens.

Pupa.—Head full, convex in front, much as in the adult; ocelli prominent; papillæ acute. Antennæ folded over the base of the narrow, acute, curved, prominent mandibles as described in *Cemonus*, and reaching to the first pair of trochanters. Lingua much shorter than in *Cemonus*; the palpi very small and slender. The fore legs are very slender, the tarsi just reaching to the middle trochanters, while the hind tarsi reach to the middle of the abdomen. The ovipositor is exserted, the wings covering the middle tibiæ and femora. Length, .15 inch.

It differs from *Cemonus* in generic characters observed in the imago. The palpi are much smaller; lingua and maxillæ much shorter, and mouth-parts generally much weaker. The head is more ovate, full and convex in front, where it is sunken and depressed in *Cemonus*. The antennæ are much slenderer, and the abdomen longer and slenderer, as the hind legs scarcely reach to the middle, where in *Cemonus* they pass beyond. The mandibles are much more slender, their tips being more acute.

Cemonus inornatus (*Say*).

Larva.—Body oblong, long, and greatly flattened, the lateral ridges of that segment very large, broadly triangular, becoming larger and more pointed towards the end of the body. The body does not narrow any until the 11th segment, when it suddenly tapers off. Above, the rings are broad, slightly convex, in the middle of the body the dorsal arches of the segments are thickened suddenly so as to give a serrate outline to the back when seen laterally; the prominences being largest and most acute on the 4th to 7th segments of the body, counting from the head. The lateral region is very distinctly separated from the dorsal. The prothoracic segment narrow and rounds a little toward the front edge. The head is flattened. Tip of abdomen rounded obtuse, 10th segment small, broad, short, obtuse, not being cylindrical and rounded as usual. Length, .32 inch.

The above are mostly generic characters. Compared with the larva of *Rhopalum* there are great differences. The head is broad and unusually flattened, the rudiments of the eyes are more prominent and conspicuous than before, owing to the flatness of the surface. The supra-clypeal piece is unusually short, broad, flat and triangular. The clypeus is very short, subtrapezoidal. The posterior half is sub-triangular, smooth, and the anterior third is roughened with the edge straight. The labrum is nearly three times as broad as long, slightly bilobate, less so than in *Blepharipus*. The mandibles are large, stout, incurved, unequally bidentate, the inner tooth very distinct, large, dark and chitinous. Maxillæ and labium rather small, cylindrical; palpi acute, as usual.

Its broad flattened head and body, serrate sides and back, and the conspicuously bidentate mandibles and prominent eye-rudiments, as well as the peculiar flattened abdominal tips, will at once distinguish the larvæ of this genus.

The larva lives in irregular burrows like those of *Rhopalum*. All the genera of this group apparently have similar habits, living in loose [redacted] to fourth joint from end of antennæ. Labial palpi 3-jointed, reaching to fourth joint of maxillary palpi. Legs long and slender, especially the tarsi. Wings long, partially overlapping the middle tibiæ. The hind tarsi reach to beyond the middle of the abdomen. Thorax and abdomen much as in the adult. Ovipositor not retracted. Hind femora and tibiæ folded in the pedicel, between the thorax and abdomen. Length .25 inch.

Passalæcus mandibularis *Cresson.*

Pupa.—♀. The head is much as in *Cemonus*, but the eyes are much narrower. The mandibles are greatly elongated, projecting far beyond the head, the tips meeting but not crossing, as they do in the imago. The antennæ are folded at right angles over the base of the jaws, reaching back to the base of the mesosternum. The maxillæ are very short, merely enclosing the labium whose base is wedged in between them. Both pairs of palpi are shorter and thicker than in *Cemonus*. The labium is distinctly triangular, with the front edge square; the palpi are 4-jointed, the basal joint minute, third longer than the second; fourth nearly twice as long as the third, reaching just beyond the base of the maxillary palpi, the latter reaching to the last joint but two of the antennæ. Wings as in *Cemonus*, though a little shorter. The limbs are arranged much as in *Cemonus;* the forelegs reach to the trochanters of the 2d pair, and the hind tarsi to the middle of the 4th abdominal segment. The abdomen is sessile, regularly ovate, the basal segment being 2/3 as long as broad, as in *Cemonus*, the tip ending in a long slender needle-like mucronate spine; the ovipositor is long and slender, exserted, the inner pair of rhabdites chitinous, the middle pair very small, slender and filiform, the 3d and outer pair somewhat incurved, much shorter than those in *Cemonus*, which are long and straight, while in *Cemonus* the mesial pair are not chitinous in the specimens before me, which, however, is apparently of the same age as those of *Passalæcus*; thus showing excellent generic characters.

In the specimen examined, which is a pupa to all intents and purposes, the body is surrounded with a subimago pellicle. It is easily recognized by its long-curved projecting jaws, the long slender body. It was found in small galleries in the stem of syringa the last of May, in company with *Cemonus*.

Rhopalum pedicellatum *Pack.*

Larva.—Body short and thick, tapering rapidly towards the head and tip of abdomen, flattened beneath a little, very convex above; segments convex, those of the thorax broad, regularly convex, smooth, not thickened posteriorly; quite different from those of the abdomen. The abdominal segments shorter posteriorly above than the thoracic ones. The posterior portion of the segment thickened so as to form a rounded tubercle, which is very prominent and distinct when the body is much curved. This portion is thickened; the tuberculous portion is much smaller in proportion to the rest of the segment than usual in Apidæ. The tip is quite extensible, subacute, terminating in a small knob-like portion. Genitals not apparent, the skin being too thick. A few sparse long hairs over the body, in which respect this genus differs from those of the other families, and it differs in its elongated extensible tip, though it is probable that this part became contracted in alcohol; when contracted, the terminal segment is rather square, not being rounded at the tip. Length of body .25 inch.

The larva burrows in the dust made by the larva of an Ægeria in the pith of the Spiræa, spinning little thin silken cocoons, half a dozen of them occurring in a space of the stem an inch long, lying loose in the galleries, some lying across the stem, and others lengthwise. The cocoon is very thin and slight compared with that of *Crabro sex-maculata*, being composed of only a few silken threads. Found April 18th.

Pupa.—♀. The middle joint of the antennal scape is bent at right angles to the flagellum, the third joint being continuous with the flagellum, while in *Pelopæus flavipes* it is more oblique, as the front of the head is longer and more horizontal, while in Rhopalum it is at right angles to the longitudinal axis of the body. The head is more vertical, less flattened on the pectus of the thorax. Mandibles thick and stout, convex, much more so than in *Pelopæus*. The antennæ do not quite reach to second pair of trochanters; in *Pelopæus*, they reach beyond the ocelli and antennæ are two very prominent acute tubercles. The ocelli are very large; the thorax much as in the imago, but broader, and the propodeum is more horizontal, the enclosure being indistinct; the mesial furrow well marked. The pedicel is broader than in the imago; the rings of the abdomen more dentate on hind edges, while the abdomen, including the propodeum, is much longer than in the imago.

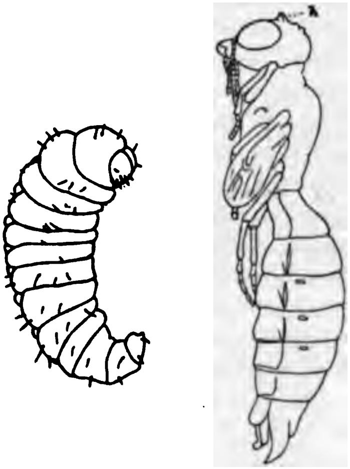


Fig. 3. Larva and pupa of *Rhopalum pedicellatum*, enlarged; *h*, temporary tubercles on head of pupa. (Trouvelot *del.*)

These details of difference in the pupa apply but to the mouthparts, which are not withdrawn in the pupa, as in the imago, and would not, therefore, be so well noticed in the imago, where these parts are much more difficult to compare.

It was interesting to find half-grown larvæ associated with the mature pupa April 18th, showing a possibility of two broods.

Odynerus (probably **albophaleratus** *Saussure*).

Larva.—The head is considerably longer than in *Vespa;* more elongated, narrower and more convex, globose. The clypeus and mouth-parts are more advanced, more prominent. Situation of eyes is not indicated by the narrow testaceous stripe. The supra-clypeal triangular piece is more distinctly marked than in *Vespa* or in the larval Apidae; it is obtusely pointed behind at the apex. The site of the antennæ forms a depressed area on a distinct piece between the eyes and supra-clypeal piece.

The clypeus is very distinct, transversely oblong, with the edges square. The labrum is large and divided deeply with two lobes, which are separated as if composed of two pieces; they overlap the mandibles so that the black tips only remain in sight. Mandibles short, stout, very thick, tridentate; the teeth short, subacute, the innermost being the smallest. The maxillæ and labium are much as usual; prominent, bulging at the end, terminating in the usual papillæ; the lingua represented by a transverse chitinous line. The body is cylindrical, long, a little curved upon itself. The skin is hard and thick, so that the genitals, nerves and dorsal vessel do not show through it. The segments are short, very convex, much thickened, especially on the tergum and the pleural line. The posterior half of each segment is more thickened than in any of the other genera of Vespidæ or Apidæ observed, and also the pleural ridges, giving to the outline of the back a dentate or serrated appearance. Tip of abdomen moderately obtuse.

The larva of *Odynerus* differs from *Vespa* in the long head, square clypeus, the very distinct bilobed labrum, which are unusually deeply fissured, and by the tridentate, stout mandibles; while by the serrated outline of the back it is related more to the larval Crabronidæ and Pompilidæ. It is interesting to observe the distinct supra-clypeal piece.

Odynerus albophaleratus *Saussure.*

Pupa.—Compared with *Vespa* the head is much more horizontal, and there is no supra-clypeal tubercle; the mandibles are much more elongated; the maxillæ and lingua are as much exposed and exserted beyond the tips of mandibles as in *Vespa*, but the whole reach farther towards the end of the body, to the 2d trochanters. The maxillæ and lingua are a little slenderer than in *Vespa*. The antennæ are more ob-

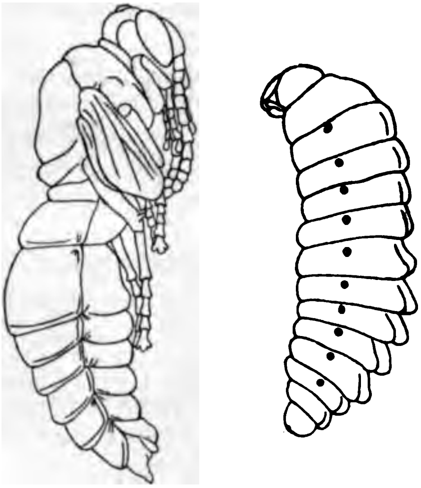


Fig. 4. Larva (enlarged 9 times), and pupa of *Odynerus albophaleratus*, uvelot *del.*)

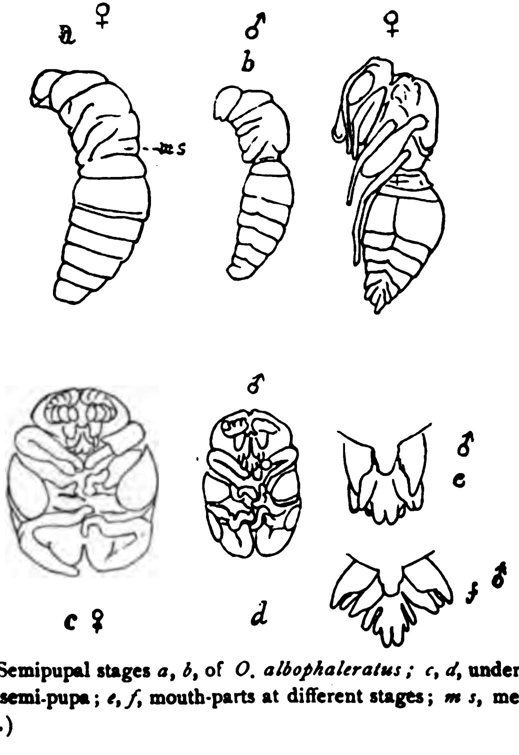


Fig. 5. Semipupal stages *a*, *b*, of *O. albophaleratus* ; *c*, *d*, under side of head thorax of semi-pupa ; *e*, *f*, mouth-parts at different stages ; *m s*, median segment. erton *del.*)

more indented, the thorax more convex, with the limbs and wings arranged much the same. The propodeum is longer and slenderer, and the subpedunculate abdomen is as in the imago, the two first segments being greatly lengthened over the terminal short retracted ones, and the tip is more incurved, so that the hind tarsi reach to the tip, and the abdomen is rounded ovate, where in *Vespa* it is oblong.

◆

A NEW ANISOTA.

BY HARRISON G. DYAR.

Many larvæ of the following species were found at West Palm Beach, Florida, on live oak in January, 1896. I am indebted to Mr. L. H. Joutel for obtaining me food plants for them during the winter.

Anisota consularis, sp. nov.

Male; smaller than the female; body ochreous brown, wings dark purplish brown, a larger ill-defined subhyaline space in the center of the fore wings; a round white discal dot. Terminal space more purplish than the basal part of the wing.

Closely resembles the male of *A. senatoria* in color, but the hind wings are rounded as in the female, not angulated at apex and anal angle, and the t.-p. line is much more obscure.

Female; wings purplish brown, basal and terminal spaces darker; a white discal dot and faint blackish strigæ. Hind wings with a purplish mesial band.

Darker than either *senatoria* or *stigma*, the lines less distinct; wings opaque, not thinly scaled as in *virginiensis*. Types male and female, bred from larvæ.

Larva. Primary spines black, secondary granules sparse, white. Head shining red-brown, width 3.5 to 4 mm. Body red-brown, a dorsal, subdorsal (i), lateral (iii), stigmatal and subventral clouded black bands. Dorsal and stigmatal bands harp and narrow, the others clouded, the subventral filling the whole space. All except the subventral are bordered by white shaded lines on the lower side, that be-

THE LIFE-HISTORIES OF THE NEW YORK SLUG CATERPILLARS.—III-VI.*

(PLATES VI-IX.)

By HARRISON G. DYAR, A. M., Ph. D.

Tortricidia pallida Herrich-Schäffer.

1854—*Limacodes pallida* HERRICH-SCHAEFFER, Ausser. Schmett. fig. 183.
1854—*Limacodes flavula* HERRICH-SCHAEFFER, Ausser. Schmett. fig. 185.
1864—*Tortricidia pallida* and *flavula* PACKARD, Proc. Ent. Soc. Phil. III, 347.
1891—*Tortricidia flavula* DYAR, Psyche, VI, 128.
1892—*Tortricidia pallida* and *flavula* KIRBY, Cat. Lep. Het. I, 551.
1892—*Isa textula* MORTON, Ent. News, III, 1.
1892—*Tortricidia flavula* DYAR, Ent. News, III, 62.
1894—*Tortricidia flavula* NEUMOEGEN and DYAR, Jour. N. Y. Ent. Soc. II, 75.

LARVA.

1891—Dyar, Psyche, VI, 145.
1892—Morton, Ent. News, III, 1. (as *Isa textula*).
1893—Packard, Proc. Am. Phil. Soc. XXXI, 104 (as young larva of *Heterogenea sp.*).
1893—Packard, Proc. Am. Phil. Soc. XXXI, 105 (as *Heterogenea testacea*).
1893—Packard, Proc. Am. Phil. Soc. XXXI, 106 (as *Heterogenes flexuosa*).
1894—Dyar, Ann. N. Y. Acad. Sci. VIII, 220.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal space moderately broad, narrowing only a little toward the extremities, arched; lateral space broad, oblique, concave; subventral space small, retracted. Ridges slightly prominent, never tubercular, furnished with single or furcate swollen-tipped setæ in stage I, afterward smooth or with rudimentary setæ. Outline from dorsal aspect elliptical notched at the anterior part of joint 13 to form a short quadrate tail. Skin covered with close, appressed, rather large, clear granules which appear immediately after the first molt and increase slightly in number at subsequent molts. Depressed spaces large, well developed, deep with sharp perpendicular sides, the bottom flat and finely granulated. These spaces are very conspicuous and so large as to divide the coarsely granu-

---

* Miss Morton has given up her coöperation in these articles. The assistance which she has kindly continued to furnish me will be specially acknowledged in each case.

lar general surface into a series of latticed ridges. They are as follows: (1) large, intersegmental, angularly elliptical; (2) small, addorsal, segmental, rounded triangular; (3) under the subdorsal ridge, small, triangular, shallow; (4) large, lateral, intersegmental, elongate or narrowly elliptical; (5) of moderate size, above the lateral ridge, rounded triangular, segmental; (6) very small, shallow, alternating with the lower part of the fifth series just above the lateral ridge. In the subventral space a shallow ill-defined series (7) alternate with the spiracles, and another similar one (8) is situated below them.

This larva is throughout very smooth, the setæ practically disappearing at first molt. The coloration is green, a large red mark in the shape of an irregular diamond or large blurred cross gradually appears on the back, beginning in the form of a small patch between two yellow lines. The marking appears to be mimetic of red patches or galls on its food plants.

The larva is rather highly specialized, especially in regard to its skin structure which somewhat approaches that of *Eulimacodes*, while the setæ disappear early. Its shape, however, is quite normal and typical of the smooth Eucleids in general, and the setæ of stage I are in a less advanced degree of degeneration than in *Apoda y-inversa* or *Tortricidia fasciola*.

AFFINITIES, HABITS, ETC.

This larva is allied to the small species which I have doubtfully identified as *Heterogenea flexuosa* and doubtless also to the European *H. asella*, though this has not been examined by me. It belongs to the group of the northern smooth Eucleids, and represents a more primitive state than *Apoda* in that setæ *ia* and *ib* on joint 4 and i and ii on the same plant. The larva remains on the back of a leaf, where its shape and coloration are adapted to its concealment.

The material from which this life history was worked out was collected by me in stage I at Keene Valley and the eggs found at Bellport, Long Island. Miss Morton endeavored to obtain fertile eggs from some cocoons which I sent her, but was unable to do so. I am indebted to Mrs. Knopf for assistance with the plate.

CRITICISM OF PREVIOUS DESCRIPTIONS.

This larva remained undescribed till very recently. In my original description I say "the usual elliptical depressions hardly distinct." This may be corrected by omitting the word "hardly." Miss Morton first described the eggs. She says they are "without form," though I should describe them as regularly elliptical and greatly flattened. I do not find them "invisible to the naked eye on the leaves" since I have found them in the woods without the aid of a lens. Dr. Packard's descriptions seem to contain but one error, besides the inaccurate nomenclature, for which I am partly responsible. His "young larva of *Heterogenea*, sp." is stage VI, and his "full-grown larva of *Heterogenea testacea*" and "larva of *Heterogenea flexuosa?*" are stage VII of *T. pallida*. The "full-grown larva of *Heterogenea*, sp." is another insect.* The error referred to is on page 105, where Dr. Packard says "there is a median dorsal row of impressed rounded warts, which do not bear bristles . . . ". I think it is evident that these structures are the glandular centers of the dorsal depressed spaces, and have no homology, or even analogy with warts.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Elliptical, flat, transparent on smooth green leaves, whitish translucent on whitish leaves, shining; reticulations faint, visible in a strong side light under a half inch objective as narrowly linear elongate hexagonal lines, slightly more opaque than the shell. Size 1.0 x .6 mm. Laid singly on the under side of the leaf.

Stage I.—(Plate VI, figs. 1 and 2) Elliptical, rather elongate, dorsal and lateral spaces rather broad. Along the subdorsal ridge, a row of Y-shaped setæ with expanded cleft tips, changing to two separate setæ on joints 3 and 13; two lateral setæ on joints 3 and 4; along the lateral ridge a row of single swollen-tipped setæ on joints 3 to 12.

---

* Doubtfully identified. Journ. N. Y. Ent. Soc. III, 146, as *Heterogenea flexuosa.*

Color translucent whitish with a slight green tint after the larva has eaten. Skin smooth. Length .7 to 1.1 mm. The larva feeds normally throughout the stage.

Stage II.—Setæ rudimentary, the mature structures well assumed. More rarely distinct, short, black setæ persist, arranged two on the subdorsal ridge, one on the lateral ridge. Subdorsal ridge rather square, dorsum flat, rounded; tail quadrate, sides concave. Lateral ridge moderate, subventral region small, retracted. Depressed spaces all present as in the mature larva, deep, pit-like, the latticed ridges narrow, distinct, composed of one row of large, clear, appressed granules. Color pale greenish without marks. The larva eats a track the width of its body, but only two or three times as long as wide. Length 1.1 to 1.7 mm.

Stage III.—Elliptical, tail rounded quadrate; all pale green. Skin structure the same as before. Usually the setæ are so rudimentary as scarcely to be visible; more rarely, quite distinct. The larva has the shape and appearance of the mature form, but is without marks. Toward the end of the stage a yellow subdorsal line may appear, with a round reddish patch centrally on the back. Length 1.6 to 2.2 mm.

Stage IV.—Elliptical, both ends rounded, the anterior more obtusely; dorsum arched, the highest point a little before the middle. Ridges low, not prominent, the subventral ridge shorter than the lateral. Body smooth, not tuberculate nor scalloped, setæ nearly obsolete. Skin coarsely clear granular, except on the large depressed spaces which are arranged as in the mature larva. The granules along the lateral ridge are subpapillose, slightly divided at the tip in some cases. Subventral space more coarsely granular. Color light yellowish green, a trace of reddish along the dorsal space on joints 6 to 9. Length 2.2 to 3.3 mm.

pressed spots; broadly bordered with yellow, which color also extended along the subdorsal ridges half way to the tail. Length 3.5 to 4.7 mm.

Stage VI.—Depressed spaces deep and well marked, finely shagreened granular in the bottom. Latticed ridges coarsely densely clear granular as before. Areas in the subventral space reniform, (7) and (8) conjoined, the granulations of this space finer than above the lateral ridge. Body green, at first scarcely marked, but during the stage the dorsal red patch appears. This varies greatly in shape in different larvæ, from a small transverse bar (Plate VI, fig. 3) to a large patch covering the dorsum of joints 5 to 9 and extending part way down the sides. There is a more or less distinct yellow subdorsal line, broken where it crosses the red patch, the patch bordered with crimson and yellow. The patch is of a varying shade of purplish red with a more or less distinct central square blotch on joints 7 and 8, the enclosed depressed spaces of dorsal row (1) centered with a dark dot. The patch may have an irregular outline as in the mature larva, but it does not reach either extremity. A small reddish patch may occur on joint 3. Length 4.7 to 6.7 mm.

Stage VII.—Smoothly rounded, elliptical, the tail subquadrate; highest through joint 5, evenly rounded (Plate VI, fig. 5). Subdorsal ridge rounded, dorsal space rather narrow, lateral broad, gradually sloping. Lateral ridge smooth, prominent, exceeding the subventral ridge. Subventral space small, hollowed. Depressed spaces large and deep, arranged as described above (Plate VI, fig. 8), their bottoms finely granular. Latticed ridges coarsely clear granular. Body green with a large dorsal marking which varies from narrow (Plate VI, fig. 6) to broad* (Plate VI, fig. 7) and from bright red to dull purplish in different examples. It has a pale salmon colored center, often square and covering only one depressed space (joints 7–8) or rarely larger, occasionally wanting. The patch is bordered with crimson and yellow and is usually darker around the edge and on the latticed ridges. It usually narrows on joints 3 to 5, widens again, reaching the lateral depressed space (4) on joints 5–6, is incised in a curve and broadens to the lateral margin at joint 8; narrows again in an incised curve to the depressed space (4) on joints 9–10, and there tapers to the tail, thus forming a large, blurred red cross. Most of the depressed spaces on the sides are pale with darker green centers. Length of the larva 6.7 to 9.5 mm.

---

* It is difficult to illustrate the range in the size of this marking without a long series of figures. The patch may be even larger than shown in figure 7.

Cocoon.—With the characters of the group.

Food-plants.—Oak, wild cherry, birch, maple, chestnut and witch-hazel have been observed.

EXPLANATION OF PLATE VI.

Fig. 1. Larva in stage I, dorsal view enlarged.
" 2. The same, side view.
" 3. Young larva × 5, the dorsal marking just starting.
" 4. The same, older × 5.
" 5. Side view of mature larva, anterior end to the right.
" 6. Mature larva, enlarged, restricted pattern.
" 7. Another larva, broad pattern.
" 8. Larva, dorsal view, showing the depressed spaces of dorsal and lateral areas; *a*, dorsal depressions (1); *b*, addorsal (2); *c*, upper lateral segmental (3); *d*, lateral depressions (4); *e*, lower segmental lateral (5); *f*, lower intersegmental lateral depressions (6).
The left side of joint 7 (third abdominal segment) illustrates the granulation.
" 9. *T. pallida*, imago.

Eulimacodes scapha *Harris.*

1855—*Limacodes undifera* WALKER, Cat. Brit. Mus. pt. V, 1149.
1864—*Limacodes scapha* WALSH, Proc. Bost. Soc. Nat. Hist. IX, 298.
1864—*Limacodes scapha* PACKARD, Proc. Ent. Soc. Phil. III, 341.
1878—*Eulimacodes scapha* MOESCHLER, Verhl. Zool.-bot. Ges. Wien, XXVII, 672.
1882—*Limacodes* (*Eulimacodes*) *scapha* GROTE, Check List, 17.
1891—*Limacodes scapha* SMITH, List, Lep. 28.
1892—*Eulimacodes scapha* KIRBY, Cat. Lep. Het. I, 535.
1894—*Eulimacodes scapha* NEUMOEGEN & DYAR, Journ N. Y. Ent. Soc. II, 73.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal area broad, narrowing before to a rounded margin on joint 3, narrowing behind to a point in the tail-like termination of joint 13. Lateral area absent, the subdorsal and lateral ridges at first closely approximate, later fused into a single, sharp, high, rounded ridge. Subventral area broad, forming all the sides, perpendicular, flat or hollowed, highest in the middle, diminishing to almost nothing at both extremities. Subventral ridge very slight, just indicated at the lower edge of the body. Primitive first stage absent, the warts present in stage I reduced by degeneration, bearing two setæ, uniformly developed; in the later stages disappearing, the rudimentary setæ persistent. Subventral row represented by small setae. Both the lateral and subdorsal warts are situated on the single subdorsal ridge. Depressed areas strongly developed but scarcely sunken, flat, plate-like, shagreened and with angular margins; the dorsal row (1) elongate transversely, hexagonal, the addorsal (2) small, rounded triangular; those of the lateral area wanting; subventral plates fully developed, rounded angular, the upper subventral (7) large, ovate, the lower (8) rounded triangular; two other small rows above the subventral edge (9) and near the spiracles (10). Skin at first almost smooth, but soon covered with granules which are flattened, appressed and rounded and appear as if overlapping like the scales on a fish, on the sides from below upward, outwardly from the middle of the dorsum to the upper side of the subdorsal ridge where the two directions of scaling meet. The scaling is only present on the latticed ridges between the closely set, slightly sunken armor plates (metamorphosed depressed areas). There is a slight hump or rounded angulation on the ridge at joints 7–8, but this may be absent or there may be two such humps, the second at the junction of joints 8 and 9. Just under the edge of the subdorsal ridge from side view is a series of glandular spots which can secrete drops of a clear odoriferous fluid. They are situated above and a little before the upper side of the large intersegmental plates (7) and appear in the cast skin as round beads. It is possible that they represent the depressed spaces of lateral area.

The coloration is adapted for concealment, the green ground work variously patched and spotted with yellowish and brown being obscure on the leaves toward autumn. The peculiar square box-like shape, produced by the union of subdorsal and lateral ridges, may be of use in suggesting to its enemies an appearance unlike that of most insect larvæ, more unusual indeed than the majority of Eucleidæ.

This larva is on the whole the most highly specialized North American Eucleid. It belongs to the group of smooth Eucleids, but is the only one in which the primitive first stage has disappeared. Though it lacks the specializations of the spined Eucleids, it exceeds them by the number of its peculiar modifications, namely, the union of the ridges to the exclusion of the lateral space, the high modification and development of the depressed spaces and the conversion of the skin granules into scales.

AFFINITIES, HABITS, ETC.

The genus *Eulimacodes* was founded by Moeschler on a species from Surinam. A larva apparently identical with our *scapha* is figured by Sepp (Suranim. Vlinders, Pl. 129) from this locality, but the moth, which he calls *gibbosa*, is quite distinct. Of our two species one is found in Arizona and doubtless occurs farther south. Therefore we may regard the present species, *scapha*, to be of South American origin and we should not expect to find it represented in the European fauna.

The moths fly in July and the larval stages occupy the summer months, the insects reaching maturity in August and September. The eggs are laid singly and the larvæ live on the under sides of the leaves, solitary, though not greatly scattered, as often several or many occur on the same plant.

There is a wide range in variation with something of a local tendency. In Long Island the form with smooth subdorsal ridge is common, with no hump or only one small one (Plate VII, fig. 13). The back is green or variously spotted with yellow and brown, rarely entirely brown, the sides generally green. In the wooded parks near New York the single or double humped form is more common, often with brown markings on measurements given that they really were stages IV and V. Two of the references include a general account of the finer external structure. A general and not unnatural error has been made in considering the sunken armor plates to represent the segments. Edwards and Elliot say "the *segments* are arranged like the plates of a tortoise," Dr. Packard refers to a marking "along the *sutures* . . . of the segments," and I have said "joints 3 to 13 have each a plate." These structures are situated between the segments, overlapping on two adjoining ones. Dr. Packard found but seven spiracles; but he must have had before him an abnormal larva, as all my specimens possess the usual number.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Elliptical, flat, 1.8 x 1.2 mm., the skin very thin, white and iridescent; the fresh egg is transparent with a slight pale yellow tint when laid on glass and becoming more opaque as the embryo develops but not darkening in color. Reticulations rounded, obscure, rarely angular, not characteristic; the surface of the egg is slightly shagreened. Another egg measured 1.7 x 1.4 x.1 mm. Laid singly on the leaves.

Stage I.—Elliptical, more pointed behind than before; dorsum flat, a little arched, separated from the perpendicular sides by a ridge bearing two rows of tubercles, each with two setæ (Plate VII, figs. 1 to 3). These represent the usual subdorsal and lateral rows, but situated in close approximation to each other. On joint 3 are four tubercles, on joint 4, three, and on joint 13, three. A subventral row of simple setæ. The shape is less boat-like than the mature larva, though all the essential features are indicated. Pale yellowish, a broad dark band along the ridge below the skin and therefore appearing in a slightly different position according to the point of view. The band is connected with its fellow at the ends and also by a bar in the center of the dorsum. Dorsal skin smooth, depressed in gentle hollows representing the dorsal (1) and addorsal (2) depressed spaces; bases of tubercles wrinkled, subgranular; lateral (subventral) skin also smooth, with two rows of faint depressions. Venter clearer yellow than the body; head pale. Length 1.2 to 1.9 mm. The larva feeds in this stage.

Stage II.—Tubercles absent, a single tiny seta represents each. Subdorsal ridge rounded, prominent. Dorsum hollowed, sides perpendicular. Skin obscurely granular, the granules flattened, nearly contiguous, not really overlapping but suggesting scales, especially before the larva is filled out by feeding. Depressed areas irregularly sculptured, creased, regular, the dorsal (1) transversely elongate, hexagonal, addorsal small, rounded; latticed ridges very narrow, almost linear, but the areas not much depressed. Sides hollowed below the round bulging ridge, which has a segmental row of round clear glandular areas on its lower aspect; surface slightly granular without well-defined sculpturing, two angular areas just indicated, the upper (7) pentagonal, the lower (8) rounded. Color greenish, the ridge broadly brown with the connecting band as before at the highest part of the dorsum. The back is a little angled at the segment posterior to this band (joints 7–8). Length 1.8 to 2.9 mm.

Stage III.—Much as before, but the depressed areas or plates are better defined. They are large, almost contiguous, still somewhat depressed, irregularly shagreened, the narrow latticed ridges, and especially the high bulging subdorsal ridge, distinctly scaled as in the full-grown larva. The dorsal plates (1) have a paired character as seen by a central line and two glandular dots on each side (Pl. VII, fig. 7). On the sides the plates are depressed, not very distinctly bounded. There can be distinguished besides those formerly seen (7 and 8) also a small segmental row just above the subventral edge (9). Dorsal and lateral areas sunken, ridge prominent, rounded, smooth. Shape elliptical, square anteriorily, tail obtusely pointed, the back evenly arching from head to tail. Coloration at first as before, but soon the great diversity in individual markings appears. In three larvæ from eggs laid by the same moth, three types appeared. The sides in all remained pale green, but the back was variously marked with reddish-brown. The extent of variation is from the minimum of a line along the subdorsal ridge with connecting transverse bar to the maximum of a complete row dorsal line on the second to eighth plates dark-brown; hump opposite fifth plate very dark; glandular centers of plates also dark; a white spot in the ridge at the eighth plate (joint 10–11) and a little one at the seventh plate best seen from the side. First dorsal plate and all the sides dark leaf-green, the glandular centers of the upper plates (7) dark. Length 5.6 to 7.9 mm.

Stage VI.—Shape and markings as in the next stage. The last four stages are throughout practically alike. Length, 7.3–12 mm.

Stage VII.—Elliptical, ending in a pointed tail; dorsum slightly concave (Plate VII, fig. 6) lowest along a line just above the subdorsal ridge where the dorsal and lateral scaling meets, greatly arched; sides perpendicular, concave, diminishing at each end and without ridges, the whole shape box-like. Setæ fine and obscure, a single one on the dorsal and lateral aspect of the ridge and a few microscopic ones on the sides near the spiracle, the latter secondary. Depressed spaces converted into scarcely sunken angular plates, the dorsal ones (Plate VII, fig. 7) suggesting the plates of a tortoise. A row of ten segmentary glands on the lower side of the subdorsal ridge secrete an odoriferous fluid when the larva is irritated. Plates as described above, the latticed ridges scaled, the two directions meeting at the lowest point of the dorsum (Plate VII, fig. 11); scales arranged as if overlapping (Plate VII, fig. 12); plates irregularly finely granular (Plate VII, fig. 12). Setæ weak, normal (Plate VII, fig. 5). Opposite the fifth dorsal plate the ridge is thrown into a prominence more or less distinct, sometimes also one at the sixth plate (Plate VII, fig. 14). These humps are intersegmental, representing the incisures of joints 7–8 and 8–9. A white spot on the ridge at eighth plate. Color very variable, scarcely two specimens alike. Ground color green, more or less replaced on the dorsum by brown or yellow or both, variously mottled and spotted, the latticed ridges and glandular spots darker usually. Sides less commonly marked with brown, but occasionally so and independently of the dorsum. The order of appearance of the dark marks is from the hump and white spot, spreading on the dorsal area, and from the middle of the subventral edge and the white spot, spreading on the lateral area. I have not seen either an entirely green or entirely brown specimen. Length, 12 to 18 mm.

Food-plants.—Various shrubs and trees. Oak, chestnut, wild cherry, hickory, sweet gum, bayberry, linden, witch hazel and hop hornbean have been noted by me.

EXPLANATION OF PLATE VII.

Fig. 1. Larva in stage I, dorsal view, enlarged.
" 2. One tubercle, more enlarged.
" 3. Stage I, side view, semidiagrammatic, to show arrangement of tubercles.
" 4. Young larva, stage IV, enlarged.
" 5. Seta of subdorsal ridge, mature larva.
" 6. Front view, stage VI, showing the high ridge and hollow dorsal area.
" 7. Dorsal view, stage VI, showing the armor plates and their arrangement.
" 8. The same, side view, showing the plates of subventral area.
" 9. Feeding traces on a small white oak leaf.
" 10. *Eulimacodes scapha.*
" 11. Skin on dorsum, a portion of one segment showing part of two plates, the latticed ridge between and the addorsal plate as far as the subdorsal ridge.
" 12. The joining of the scaled latticed ridge and the armor plate, more enlarged.
" 13. Mature larva, slightly enlarged, Long Island form, without humps.
" 14. The same, two-humped form from Fort Lee.

Phobetron pithecium *Smith & Abbot.*

1797—*Phalæna pithecium* SMITH & ABBOT, Lep. Ins. Georgia, II, pl. 74.
1827—*Phobetron abbotana* HÜBNER, VERZ. bek. Schmett. 398.
1841—*Ecnomida pithecium* WESTWOOD, Nat. Lib.. Exot. Moths, 183.
1841—*Limacodes pithecium* HARRIS, Rep. Ins. Mass, 304.
1864—*Phobetron pithecium* PACKARD, Proc. Ent. Soc. Phil. III, 340.
1864—*Thyridopteryx nigricans* PACKARD, Proc. Ent. Soc. Phil. III, 350.
1864—*Limacodes hyalinus* WALSH, Proc. Boston Soc. Nat. Hist. IX, 299.
1864—*Limacodes tetradactylus* WALSH, Proc. Boston Soc. Nat. Hist. IX, 300.
1869—*Limacodes pithecium* HARRIS, Ent. Corr. 244.
1885—*Phobetron pithecium* DIMMOCK, Psyche IV, 280.
1894—*Phobetron pithecium* NEUMOEGEN & DYAR, Journ. N. Y. Ent. Soc. II, 70.

LARVA.

SPECIAL STRUCTURAL CHARACTERS.

Outline rounded quadrangular, exclusive of the appendages, dorsal space broad, even, flat; lateral space broad, subventral comparatively broad, continuous with the lateral space, not retracted. Ridges practically absent, the subdorsal indicated by the change in direction of slope between back and sides. Tubercles greatly modified: stage I represents a primitive first stage, but tubercles i and ii on abdomen, ia and ib, iia and iib on thorax are completely united into a single spine. probably by a process, such as is indicated by the Y-shaped and pronged setæ of *T. pallida* and *T. fasciola*. Tubercle iii of joint 5 is absent. After stage I the setæ reappear double, normal. The ultimate structure of the warts, which appear at first molt, is remarkable. The subdorsal series are attached by very broad bases, greatly encroaching on the dorsal and lateral spaces, and are produced laterally into fleshy appendages of different lengths. These appendages are constricted at about the center of the attachment; the basal part bears seta i in its center; the terminal part bears seta ii at the apex. The lateral row of warts form small, rounded, button-like structures, concealed for a long time beneath the large subdorsal appendages. These warts of both rows are composed of soft spongy tissue and they readily become detached at their bases, leaving a small denuded area, which does not bleed. If the appendages are detached toward maturity, they are not regenerated; but if early in life a partial regeneration occurs at each molt, so that the structure may attain nearly its normal appearance. The subdorsal warts are each pushed a little forward so as to partially cover the segment in front. The warts bear at first stiff, smooth, pale setæ. Gradually a series of fine, secondary, branched hairs (Plate VIII, fig. 11) appears, and in the last stage, completely replaces the primary coating, leaving only the primitive setæ and a few club-shaped black hairs, which represent the last degenerate form of the original coating. In the case of the lateral horns the change from simple to fine branched hairs at the last molt is more sudden. The skin is covered with a sparse coating of fine black hairs from large tubercles (Plate VIII, fig. 15). The depressed spaces are hardly represented at all; the spiracular series (7) only is faintly shown. The appendages are formed by the subdorsal horns of joints 4 to 12 inclusive; all the others form warts of the small button-like type.

This curious larva seems to mimic a dead dry leaf. In respect to its adaptive characters it is highly specialized, perhaps the most highly specialized of any Eucleid; yet in respect to its setæ it is very primitive. It belongs distinctly to the section of spined larvæ from the absence of a tubercle of the lateral row on joint 5, and the moving up of the spiracle; yet it is without stinging spines, the warts are hairy, a primitive first stage is present as in no other spined Eucleid, and the arrangement of the warts on the thorax corresponds strictly with that of the smooth Eucleids, there being three well developed warts on joints 3 and 4. It is, therefore, a generalized form, a connecting link between the groups of Eucleidæ and of particular interest. If we disregard its special adaptation, which is unique, this form represents the early stem of the spined Eucleids, at a time before the primitive first stage was lost, before the setæ had become poisonous spines and while the original number of warts were yet present on the thorax. It is only slightly removed from the stem of the smooth Eucleids, differing from them in the specialization of joint 5, the complete coalescence of setæ i and ii in stage I, and in the only partial degeneration of the original setæ* of the warts, which is complete in the smooth Eucleids, but in Phobetron advances slowly throughout ontogeny. The number of larval stages appears to be abnormally large. I have not specially investigated the constancy of this number.

AFFINITIES, HABITS, ETC.

The allies of this larva are to be found in South America. Stoll figures the larva of *hipparchia* exactly like that of *pithecium*, as far as can be seen from the figure. We have also in Florida the species *beutenmuelleri*, which seems nearly allied, though the larva is unknown. The habits are in general similar to those of the other Eucleidæ. The eggs are laid singly, and the larvæ live on the under sides of the leaves till the last stage, where they rest on the upper side and feed fully ex-

CRITICISM OF PREVIOUS DESCRIPTIONS.

There are no descriptions of the youngest stages of this species. The references given above cover descriptions and figures of the mature larva, many of them inadequate. Walsh describes a larva as *tetradactylus* with but four pairs of long appendages instead of six. I think he had before him a specimen in which the appendages of joint 8 were broken off on both sides, which would leave "the third and sixth pairs" long as he describes, if the missing appendages be not counted. This is very probable, as I often find larvæ in various degrees of dilapidation. A specimen occurred in which all the appendages were absent except the last two pairs. It was a hardly recognizable object, yet alive and healthy. I have also recorded* an example in which the third appendage (joint 6) was absent on both sides.

Dr. Packard described a larva as "*Phobetron*, sp.," apparently regarding it as distinct from the common form; but his brief description contradicts *pithecium* in nothing. This larva is said to possess some stinging power, but Dr. Packard figures no stinging spines among his excellent plates (Proc. Am. Phil. Soc., xxxi, pl. II and III, figs. 11 and 12), and I have been unable to find any such on the larva.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Flat, circular, not elliptical as usual, scarcely shining, dark ocher yellow, almost brownish; diameter 1.2 to 1.4 mm., height about .1 mm. Reticulations rounded hexagonal, regular, very obscure scarcely defined lines resembling the joinings of cells. Laid singly, very rarely two overlapping. The developing embryo finally causes the egg to turn dark brown. Hatches in 10 days.

Stage I.—Rounded elliptical, the spaces proportioned about as in the mature larva, on joints 3 and 4 are three, on joint 5 one, and on joints 6 to 13, two each of long spines, subequal, composed of a tapering proximal portion with enlarged base and more slender tapering distal portion (plate, figs. 1 and 2). Of the subdorsal row, those on joints 7, 9 and 11 lean outwardly, alternating with the others. All have the bases slightly wrinkled. Below the spiracles a series of setæ arise from the subventral edge. Color dark brown, darkest along the subdorsal ridges; a broad whitish dorsal line. Spines white at base, the ends of the proximal part (hypertrophied tubercle) black, the distal part (seta) dusky, both finely spinulose. Head blackish, especially on the vertex.

When first hatched, the tubercles are small and bear only the dusky setæ, shorter than the white hairs of subventral row; but soon the tubercles elongate, forming the pale basal portion of the spine. Skin smooth, slightly shining. The larva feeds in this stage. Length 1.2 to 1.8 mm.

---

* Ann. New York Academy of Sciences, VIII, 218, note 2.

Stage II.—Instead of the spines of the subdorsal row are now present on joints 4 to 12 a series of laterally extended, short, conic, fleshy appendages, projecting about half their length beyond the sides; those on joints 7, 9 and 11 much shorter than the others, which are of equal length; all densely covered with coarse, smooth, pale spines. The other setæ, namely all those of joint 3, the lateral row and those on joint 13 form small pale tubercles, with a single hair, inconspicuous, being obscured by the appendages of the subdorsal row. Color dead-leaf brown, the tips of the appendages whitish, the outline evenly fringed by the white spines. Dorsal space narrow, clothed by a few small dark setæ. On the sides, owing to the broad attachment of the subdorsal appendages, the lateral space occupies but one-third, the subventral space two-thirds of the area, both perpendicular. Lateral area brown; subventral dull whitish. Length 1.8 to 2.5 mm.

Stage III.—(Plate VIII, fig. 3) Elliptical, the back flat, produced by laterally extended appendages; side area small. Appendages as before, but longer, each slightly constricted near the base, rather sparsely covered with stiff, pale setæ, arising from conical bases. Yellowish-brown, a double blackish spot on the top of each appendage, the tips pale; subventral edge white. A tuft of fine short hairs in the center of each segment of dorsal space. Lateral tubercles with single seta; subventral setæ double. Head testaceous, the eye black. Length 2.5 to 3.5 mm.

Stage IV.—Appearance as before, but the horns are more densely with a central pale line and pale tip; setæ pale, simple as before, but supplemented by many very fine short curved hairs, also simple. The primitive setæ may be distinguished, arranged as in the mature larva, i on the basal portion, ii on the apex of the subdorsal horns. Length 5 to 7 mm.

Stage VI.—Long horns longer, short ones shorter in proportion than before, the second, third and fifth pairs (joints 5, 6 and 8) curved backward, sickle-shaped the seventh pair (joint 10) forward. Nine pairs visible from above, first and eighth short, fourth and sixth very short. Each has a distinct constricted basal piece, the terminal setæ of both portions arising from a round tubercle. Horns covered with large stiff, smooth, pale setæ and also with fine, short, broadly branched hairs which become very dense at the apices of the long horns, giving the appearance of rusty brown tips. On the short horns these fine setæ are few or absent. A few dark hairs on the dorsum as before. Lateral horns and the lower ones of thorax short, conic, with many pale spines and a pale bare tip. Color brown, the horns darker with a white stripe up the middle. Subventral area broadly white. As the larva grows the bases of the subdorsal horns swell up on the lower side. Length 6.5 to 8.5 mm.

Stage VII.—Shape and proportions of the appendages much as in the mature larva, but slenderer and the posterior ones less closely applied to each other. The first, second, third and fifth pairs curve backward, the seventh and eighth forward, the tenth pair is just visible from above. Clothing of the horns more modified than before. The fine brown branching secondary hairs are thick, especially along the anterior edges of the long horns; the coarse pale hairs are still present about as before on the basal pieces and short horns, but on the long horns outwardly reduced in number and partly converted into long pale setæ irregularly spinulated toward the tip on one side. Lateral tubercles with a bare tip, from which arises the primitive seta, surrounded by a circle of stiff hairs. Color brown, the horns darker, a pale gray line up the middle of each, furcate on the basal pieces; subventral edge white. The long white hairs are on the posterior edge of the horns, away from the greatest number of fine brown hairs. Length 8 to 10 mm.

Stage VIII.—All pale whitish brown with scarcely any marks. Hair clothing almost exactly as before, except for the addition of a few black, club-shaped spinulated hairs (Plate VIII, fig. 12) on the long horns. Seta ii of subdorsal row on the long horns arises from a bare cone surrounded by a brush of little black spines. Lateral row well spined, but the spines all simple, the seta from a bare cone as before. The coarse setæ on the horns still present, rather less in number than before, and the fine branched hairs are more numerous. The long horns bear six kinds of hairs in this stage: (1) the primitive setæ, (2) the smooth pale setæ, (3) the long pale spinulated hairs, (4) the fine felted secondary hairs, (5) the club-shaped black hairs and (6) the fine spines on the tip. Length 10 to 13.5 mm.

Stage IX.—(Plate VIII, figs. 5, 6 and 7) Shape as described above. The third, fifth and seventh pairs of appendages longest, second and eighth next, first, fourth, sixth and ninth short. The side view (Plate VIII, fig. 6) shows how these may be variously elevated by the larva. The body is sparsely clothed with fine dark setæ (Plate VIII, fig. 15), the appendages both of subdorsal and lateral rows covered only with the fine branched secondary hairs (Plate VIII, fig. 11). The primitive setæ remain and at the tips of subdorsal horns a circle of very short black branched hairs (Plate VIII, fig. 10). These are absent on the side horns (Plate VIII, fig. 8). The black club-shaped hairs also remain, irregularly scattered toward the tips of the long horns; but all of the stiff pale setæ are absent. Any of the appendages of either row may be detached by slight force. They leave a bare area, and the subdorsal ones show a double attachment (Plate VIII, fig. 9) corresponding to setæ i and ii. The larva is quite uniformly colored, varying from tan color to purplish brown. The subventral edge is usually broadly white and the sides and under sides of the horns darker than the upper surface. The fine hairs on the horns are so dense and closely felted that they give the shape to the appendages as shown in the figures 5, 6 and 7. Length of larva 13.5 to 22 mm.

Cocoon.—As usual except that as all the tubercles are shed at the time

Fig. 8. One of the warts of the lateral row enlarged.
" 9. One of the long horns (detached) of subdorsal row, enlarged, ventral view, showing the double attachment.
" 10. The terminal seta (ii) and the area immediately around it from the tip of one of the long appendages.
" 11. One of the branched secondary hairs of the thick coating of the appendages × 175.
" 12. Apex of one of the club-shaped hairs which remain on the long appendages in the last stage × 200.
" 13. Male moth, *Phobetron pithecium.*
" 14. Female moth, " "
" 15. A group of the skin setæ with their tubercles.

Sisyrosea textula HERRICH-SCHAEFFER.

1854—*Limacodes textula* HERRICH-SCHAEFFER, Ausser. Schmett. fig. 184.
1864—*Isa textula* PACKARD, Proc. Ent. Soc. Phil. III, 347.
1867—*Limacodes inornata* GROTE & ROBINSON, Ann. Lyc. Nat. Hist. N. Y. VIII, 372.
1876—*Sisyrosea inornata* GROTE, Can. Ent. VIII, 112.
1882—*Sisyrosea inornata* GROTE, Check List, 17.
1891—*Isa inornata* DYAR, Ent. News, II, 156.
1891—*Isa inornata* SMITH, Check List, 28.
1892—*Sosiosa textula* KIRBY, Cat. Lep. Het, I, 551.
1894—*Sisyrosea inornata* NEUMOEGEN & DYAR, Journ. N. Y. Ent. Soc. II, 70.

LARVA.

1869—HARRIS, Ent. Corresp. pl. ii, fig. 7; pl. iii, fig. 6.
1887—HULST, Ent. Amer. III, 66.
1889—DYAR, Can. Ent. XXI, 77.
1893—BEUTENMUELLER, Bull. Amer, Mus. Nat. Hist. V. 89.
1893—PACKARD, Proc. Am. Phil. Soc. XXXI, 97; pl. iv, figs. 13, 14.
1894—DYAR, Ann. N. Y. Acad. Sci. VIII, 219.

SPECIAL STRUCTURAL CHARACTERS.

Dorsal space narrow, especially centrally, lateral space broad, very oblique, subventral space very small, retracted; form much flattened, the principal part of the visible surface consisting of the lateral spaces. Outline elliptical; subdorsal ridge slight, lateral pronounced. Horns of both ridges extended laterally, those of the subdorsal ridge reduced in size, flattened, subequal, those of joints 8 and 10 slightly shorter. Lateral horns produced and flattened, slender, fringing the sides and touching the leaf when the larva is at rest, subequal, those of joints 13 slightly longer. The spines on the horns are of the normal stinging type after stage I, but not strongly developed and they tend to degenerate in the later stages, their piercing caps being partly replaced by setæ. Those on the red anterior edge are shortened and darkened by black pigment. The arrangement of the horns is normal for the spined Eucleids, a single segmentary subdorsal row on joints 3 to 13 and single lateral row on joints 3, 4, 6 to 12. In stage I the horns are surmounted by a central swollen-tipped seta and a small series arranged around it in a radiating circle. Skin covered by a series of curious wavy folds which extend on the horns also, but less distinctly. This structure is unique and its origin obscure, though it seems to be produced by the ordinary skin granules becoming concave and their raised edges confluent.

Depressed spaces represented by whitish rings with dark centers, fairly well developed; (1) and (2) are situated closely in line in the small dorsal space, both paired; (4) and (6) are situated on the posterior half of the segment in the lateral space in two small areas devoid of green pigment, which are connected narrowly along the incisure; (5) is small and round, situated below (6) just above the base of the lateral horn toward the front edge of the segment. Subventral space without distinct marking. The spiracle on joint 5 is situated above the line of the lateral horns, nearly uniform with the white spots (5); those on joints 6 to 12 are below the horns, well hidden in the retracted subventral space. No caltropes or detachable spines are present. This highly specialized larva departs widely from its congeners in many respects. Its form is unique and its skin structure much more specialized than any of the other spined Eucleids. The horns are nearly equally developed, and in this respect the larva is more generalized than its allies, as also the presence of more than three setæ on the horns in stage I, indicating less advance in the degeneration of this stage. The peculiar lateral direction of the horns is somewhat paralled in *Phobetron*, season—during July. The eggs are laid singly and well scattered. The young larvæ after emergence from the egg rest at the edge of the leaf on the under side and moult at once without feeding. During their life history they remain on the under side of the leaves, finally falling to the ground to spin their cocoons during September. They occur on forest and shade trees, not usually on very low bushes.

There are eight larval stages normally, occasionally nine, the extra stage being interpolated between the last two as in *Euclea.*

The present life-history was worked out from a newly hatched larva which I found on a white oak leaf at Bellport, Long Island, resting beside its egg shell.

CRITICISM OF PREVIOUS DESCRIPTIONS.

Harris' figures are good. In the colored one the yellow subdorsal line is omitted, while in the structural one the thoracic region is not properly segmented. Dr. Hulst describes the *head* as "strongly bifid, etc.," evidently referring to the anterior edge of joint 3; otherwise the description is excellent. In my own first general description I omitted to mention the subdorsal horns. In my later one I located the second and third subdorsal pair too far forward (they are on joints 4 and 5, not on 3 and 4 with a gap at 5 as I stated), and I mistook the lower lateral segmental glandular dots (5) for spiracles on joints 6 to 12, thus placing them above, instead of below, the lateral horns. Mr. Beutenmueller locates the red marks on segments 8 and 10 instead of 9 and 11, probably owing to a failure to recognize the true relations of the anterior horns. Dr. Packard treats this species with unusual brevity, confining his remarks to an explanation of the figures of the spines of the lateral horns. Yet, curiously enough, an error has crept in, for the figure is stated to represent "one of the lateral tubercles of the first abdominal segment" (joint 5), which really bears no lateral horn at all.

The attention given to this curious larva heretofore is far less than it deserves. The early stages are entirely unnoticed.

DESCRIPTION OF THE SEVERAL STAGES IN DETAIL.

Egg.—Elliptical, flat, reticulations distinct in the empty shell, linear, triangular, quadrangular, rarely pentagonal, irregular; transparent, colorless, the shell white; size 1.6 × .9 mm. Laid singly on the under side of a leaf.

Stage I.—(Plate IX, fig. 1) head whitish, eye black; body elliptical, dorsal space broadest anteriorly, gradually narrowed to the tail, not narrower centrally. Segments fairly well marked; skin perfectly smooth. A subdorsal and a lateral row of thick processes with an apical seta and radiating crown (Plate IX, fig. 2) the terminal half of each more slender than the basal half and with an enlarged tip. There are eleven of the horns in the subdorsal row (joints 3 to 13) and nine in the lateral row (joints 3, 4, 6 to 12), all about alike in size. The subdorsal row stand at about 45° with the body, the lateral row are horizontal. Color whitish, a faint, more opaque yellowish tint on joints 6 to 9 centrally. Length 1.1 mm. The larva does not feed.

Stage II.—Horns shaped much as before, but covered with pale, black-tipped spines with swollen bases as in the mature larva (Plate IX, fig. 6), but only about twelve on each horn. Skin finely clear granular. Dorsal depressed spaces (1) double, small and round. Horns of subdorsal row all alike; those of lateral row on joints 3 and 4 a little longer than the rest, the apical spine setiferous. Dorsal space rather broad, even, rounded at joint 3; lateral space rather large, diminishing at the ends; subventral space very small. Ridges marked by the moderate rounded horns, the subdorsal row projecting rather more than 45°, but not horizontal. The larva is not greatly flattened, both the ridges being prominent. Under a high power the skin appears creased shagreened, almost scaly, uniform. Color ground glass white, immaculate, except the black tips of the spines. Length 1.1 to 1.8 mm.

Stage III.—Elliptical, gently flattened; dorsal space rather narrow, of even width, lateral space broad, oblique, diminishing at the ends; subventral space small, contracted. Horns subequal, slender, tapering, conical, the subdorsal ones extending at about 60°, the lateral horizontal; spines slender, short, with small black tips. The subdorsal horn on joint 13 and the lateral ones on joints 3 and 4 are a little obscure raised area down the anterior side of each segment; lateral depressed spaces (4) and (6) show as white dots. Dorsum evenly shagreened, the white paired dots (1) visible on joints 3 and 4, and 4 and 5. Length 3.2 to 4.4 mm.

Stage V.—Similar to the mature larva in shape, subdorsal horns projecting horizontally, only half as long as the lateral horns, those on joints 8 and 10 slightly shorter, that on joint 13 longest; all slender, fringed by the black-tipped spines. Skin wrinkled shagreened, the horns also wrinkly. Yellowish green, the yellow subdorsal line broad, a red dot on joint 9 anteriorly. Subdorsal horns of joint 3 and lateral of 3 and 4 red throughout, the subdorsal pair on 3 connected by a faint red line. Other subdorsal horns yellowish green, the one on joint 9 more distinctly yellowish. Lateral (4) and lower intersegmental lateral (6) dots visible as before. Length 4.4 to 6 mm.

Stage VI.—Flattened, dorsal space narrowed centrally at joints 7 to 11. Subdorsal horns one-third the length of the lateral ones, those on joints 8 and 10 shorter, all flattened, projecting horizontally. Color green, the dorsal space pigmented. Dots of depressed spaces (1) double and paired on joints 3 to 4, elsewhere scarcely indicated. On the sides a green line on the anterior side of the segments, the posterior part whitish and containing a large reniform glandular spot (4), a large round green centered one (6) and a small white dot (5) on the green band below. A yellow line on the subdorsal ridge, a central red dot on joint 9 surrounded by yellow. Anterior horns dark red as before, joined by a red stripe and armed by black spines. The other horns pale and armed as before. The black spines differ only in color from the others. Skin covered with long waved ridges instead of granules. Length 6 to 8.3 mm.

Stage VII.—Essentially as before, and also closely like the mature larva. Color green, a red dot on joints 9 and 11 anteriorly between the yellow subdorsal lines; front edge red as before with short black spines. Some of the spines of lateral horns bear long setæ instead of short tips, and thus cause a more fringed appearance. Length 8 to 12.6 mm.

Stage VIII.—(Plate IX, figs. 3, 4, 5 and 7) Shape as described above. Green, pigmented in dorsal space and on the raised bars along the anterior edge of the lateral segments. Glandular dots whitish, the spots on the sides (4) and (6) surrounded by some green pigment and appearing as broken whitish rings with dark centers. Anterior edge red, rarely also the tips of all the horns. A distinct yellow subdorsal line running onto the horn of joint 13. Red marks on joints 9 and 10 usually broken into paired dots, sometimes supplemented by smaller dots on joint 12. Dorsal depressed dots (1) and (2) small, paired, distinct. Spines as before, the skin coarsely creased as in the previous stages. Length 12.6 to 18.5 mm.

Food-plants.—Chestnut, oak, beech, elm, maple, hop hornbeam, hickory and linden have been observed.

EXPLANATION OF PLATE IX.

Fig. 1. Larva in stage I, side view, enlarged.
" 2. One of the tubercles of stage I, further enlarged.
" 3. Mature larva, side view enlarged.
" 4. The same, front view.
" 5. The same, dorsal view.
" 6. Portion of the lateral area of one segment, showing the skin sculpture, the three depressed spaces (the upper one (4) only in part) and the lateral horn with its spines—enlarged; anterior side to the right.
" 7. Dorsal view of the mature larva showing all the depressed areas except (4), which are nearly completely hidden beneath the subdorsal horns.
" 8. Feeding traces of the larva on a black oak leaf, in stages II and III.
" 9. *Sisyrosea textula*, female.
" 10. The same, male.

◆

ADDITIONS TO THE LIST OF LONG ISLAND SPIDERS.

By NATHAN BANKS.

Since the publication of my list of Long Island spiders (Journ. N.

tober. The cephalothorax and legs are pale-yellow; the anterior tibiæ rather blackish; abdomen pale, with black marks as follows: a basal band, a broad band before the middle, containing four pale dots, a narrow band beyond middle, and a large triangular spot before the tip, containing some small, pale chevrous; the first three bands are connected by a dark medium stripe.

AGALENIDÆ.

Cœlotes longitarsis *Em.*—Several specimens under leaves in Carpenter's woods, October.

DICTYNIDÆ.

Dictyna, sp?—Several specimens under rubbish on the beach, at Bayville, July. Perhaps it is *D. bostoniensis.*

THERIDIDÆ.

Spintharus flavidus *Hentz.*—Swept from herbage in woods, August; both sexes.

Theridium globosum *Hentz.*—In low herbage, June.

Teutana triangulosa *Walck.*—One specimen in the house.

Crustulina guttata *Reuss.*—Under dead leaves, June, July.

Ceratinopsis interpres *Cambr.*—Swept from an old field, June; several specimens.

Lophocarenum erigonoides *Em.*—In moss, October.

Tmeticus tridentatus *Em.*—Not uncommon under leaves in wet woods, October, November.

Tmeticus plumosus *Em.*—One ♂, October, under leaves.

Tmeticus flaveolus *Banks.*—In moss, October.

Tmeticus pallidus *Em.*—In moss, October.

Gonatium rubens *Blk.*—One ♂, in woods, October.

Microneta viaria *Blk.*—Under dead leaves, October.

EPEIRIDÆ.

Larinia borealis *Bks.*—A fine ♀ of this northern spider was taken from a mud-dauber's nest, in June.

Eugnatha straminea *Em.*—Mill Neck, sweeping, May.

THOMISIDÆ.

Philodromus, sp.?—Two young specimens were taken from a pine tree at Bayville, perhaps *P. robustus* Em.

LYCOSIDÆ.

Lycosa carolinensis *Hentz.*—In old fields, June.

Lycosa ocreata *Hentz.*—In fields, June; some are very pale, others very dark colored.

Pardosa brunnea *Em. ?*—One ♂ from Mill Neck; the palpus is like this species, and the legs are properly marked, but the cephalothorax and abdomen are wholly dark, and very hairy.

Pardosa littoralis, sp. nov.

Length, ♀ 6 mm., ♂ 5 mm. Cephalothorax pale yellowish, with a black seam on posterior sides, eyes on black, a broad, brown, straight stripe from each dorsal eye to the hind margin, leaving a pale median area broader in front; clypeus and mandibles pale; legs pale yellowish; sternum and venter pale, each with a median dark stripe, abdomen dark brown above, a pale yellow basal spear-mark, and behind this are two rows of geminate pale spots. In the ♂ the stripes on the cephalothorax are broader and black; the clypeus and mandibles dark; the palpi all black; the femora mostly black, except at tips; the abdomen, above and below, and the sternum, black; a few pale spots on the bases of hind coxæ. The cephalothorax is not very long and not much narrowed in front, the legs are rather short, with two pairs of long spines under the anterior tibiæ and metatarsi. The epigynum shows a triangular depression, one and a-half times longer than broad, with rounded corners, and a narrow median finger which broadens in the posterior third to occupy nearly the whole cavity. The male palpus, from the side, shows three, black, rounded projections, the lower one the smallest.

Several specimens from a salt marsh near Mill Neck, in June.

OXYOPIDÆ.

Oxyopes salticus *Hentz.*—From an old field, June.

ATTIDÆ.

Saitis minusculus, sp. nov.

Length, ♀ 2.3 mm., ♂ 2 mm. Cephalothorax reddish brown, blackish in eye-region; mandibles whitish; legs pale, prominently banded with black, except the anterior femora in the ♀ which have a dark stripe each side, and the femora and anterior tibiæ of the ♂ which are wholly dark; sternum brown; abdomen in the ♂ black, above and below, in the ♀ gray, with two rows of small, indistinct pale spots above; venter whitish with three parallel dark stripes; body mostly clothed with fine white hair; ♂ palpi snow white. Eye-region plainly less than thoracic region, broader in front than behind; legs short, third pair about as long as fourth; hind metatarsi spined at middle and tip; anterior coxæ separated by more than width of labium. The epigynum shows two large, connate circular spots; the ♂ palpus has apparently no projection or a very small one, to the tibia, the bulb is large, transversely divided, part of the basal half dark colored, a short straight style at the end of the upper half.

One ♂, one ♀, and one young ♂, under leaves, Sea Cliff, N. Y., May. Easily recognized by its small size, banded legs, and white palpus of the ♂.

◆

A NEW SPECIES OF GOMPHUS.

By NATHAN BANKS.

Perhaps the first thing to do in describing a species of *Gomphus* as new is to apologize for doing so. Specimens of this species have been sent to me several times during the past few years, and I have been unable to fit it to any of the numerous species. To several of them it is closely allied, yet appears to differ from them more than some of them differ from each other.

The species of the genus *Gomphus*, as restricted, can be arranged in several groups. One, the one in which this new species would fall, may be characterized as follows: apex of ♂ abdomen not dilated, tenth segment black above; no spines on the vertex of the ♀. In this section would fall *G. parvulus*, *fluvialis*, *amnicola*, *lividus*, *albistylus*, *nævius* and *brevis*. The new species, which is from Ithaca, N. Y., is readily separated from *G. parvulus* by several characters, such as larger size, wholly pale front, the markings on thorax, etc. In *G. fluvialis* the ninth segment of the ♂ is nearly four times as long as the tenth; in the Ithaca species it is about twice as long; *G. fluvialis* also differs in the shape of the front, in various markings, and in shape of the ♂ appendages. *G. amnicola* is compared to *G. fluvialis*. The appendages are stated to be the same; no mention is made of a difference in the length of the tenth segment from that species; a longitudinal ridge is mentioned on the center of the vesicle; none is seen in the Ithaca species; the basal fascia of the front is said to be triemarginate, such cannot be affirmed of the new form; nor has the latter a black margin on the labrum, and the dorsal carina is not unusually high. However, *G. amnicola* must be more closely related than any of the preceding species. *G. lividus* differs considerably in markings, etc.; it is, rather, a southern species.

To the other three species, *G. brevis*, *albistylus* and *nævius*, the Ithaca form is closely allied. The last two of these are known only from the female. But they are all too small; *G. albistylus*, which is the largest, has the abdomen of 29 mm. long; in the Ithaca species it is 33 to 35 mm. long. *G. albistylus* has various black markings around front and mouth-parts, also a yellow spot in middle of vertex, these not present in the new species; besides the prothorax is differently spotted, the stripes on the dorsum of thorax different, different abdominal markings, and the vulvar lamina is different. *G. nævius* is similar to the preceding species, but the vulvar lamina is still shorter and rounded at the tips; this species is still smaller, abdomen only 25 mm. long; other differences the same as in *G. albistylus*. *G. brevis* has the abdomen 26 mm. long, the pterostigma pale yellow, various markings on front and near mouth, in the ♂ a tooth behind the eye near the occiput, the border of occiput straight; none of these apply to the Ithaca species, nor will the markings on thorax and abdomen agree with it.

Gomphus descriptus, sp. nov.

Abdomen ♂ and ♀ 32 to 35 mm. long (exclusive of appendages). Hind wing 30 to 31 mm. long. Pterostigma yellow brown, about 3 mm. long, over 3 to 4 cells in ♂, over 5 in ♀; two rows of discoidal cells; 12 to 14 antecubitals, 10 to 11 postcubitals. Front and mouth-parts uniform greenish, except brown tips to mandibles, ing the ends of the segments, on 3 to 7, sometimes on base of 8; membrane at base of 9 and 10 yellow; sides of 1 yellow, and of 2, except behind the ears and on posterior margin; yellow on base of 3; sometimes on 4 to 7 a basal spot, and sometimes an apical one on 7; sides of 8 mostly yellow, with a projection above; border of 9 yellow, and lower apical portion of 10; 10 about one-half as long as 9; appendages black; superior pair longer than 10, divaricate, acute at tip, at half their length on inner side below is a large sharp pointed tooth; inferior pair but little shorter, and with the branches more widely divaricate, than the superior pair, upturned at tip. In the ♀, the dorsal stripe on 1 and 2 is much broader and the sides of 1 and 2 wholly yellow; on the sides of 3 to 7 is a long yellowish mark with its tip turned down, on most of the segments the basal portion of this mark is separated from the rest; sides of 8 yellow, with projections upward; sides of 9 and 10 yellow, and a narrow median stripe above on 10; superior appendages black, rest yellowish; vulvar lamina black, one-third as long as 9, apical half bifid and divaricate, the tips acute.

Described from six males and two females, collected at Ithaca, N. Y., and sent me by Mr. MacGillivray; May 21, 1890; May 15, 1894; May 18, 1895.

◆

A SHORT REVIEW OF THE CHRYSOMELAS OF NORTH AMERICA.

BY MARTIN L. LINELL.

The following attempt at a synopsis of the species entered in our check-list under the generic names of *Doryphora* and *Chrysomela*, is based principally upon the material in the U. S. National Museum, but I am also greatly indebted to Messrs. Schwarz and Hubbard and Mr. H. Ulke for access to their extensive collections as well as for valuable information.

The genera may be separated as follows:

Last joint of palpi short, truncate.
    Mesosternum prominent, tuberculiform between the coxæ. Anterior femora of male strongly toothed...... ....**Labidomera** *Chevrolat.*
    Mesosternum not surpassing the level of prosternum. Femora simple. **Leptinotarsa** *Stål.*
Last joint of palpi not shorter than penultimate.
    Claws parallel, connate at base ....**Zygogramma** *Chevrolat.*
    Claws divergent.
        Sides of thorax not incrassate. Elytra with darker markings limited by impressed punctures....................**Calligrapha** *Erichson.*
        Sides of thorax incrassate. Elytra not maculate....**Chrysomela** *Linné.*

Genus Labidomera *Chevrolat.*

Contains only *L. clivicollis* Kirby, and its variety *L. rogersii*

Leconte. It is dark blue, elytra reddish yellow with typically a common large cruciform post-scutellar spot, an elongate triangular humeral spot and a V-shaped subapical. The humeral and scutellar spots are often confluent, forming a broad transverse band. The variety has the spots broken up into smaller ones and occurs principally in Texas and Kansas.

Genus **Leptinotarsa** *Stål.*

Elytra unicolorous.
  Reddish yellow; antennæ, palpi, legs and scutellum black; elytra punctate in subgeminate striæ. (Tex., N. Mex., Ariz., Mex.) **L. rubiginosa** *Rogers.*
  Dark cupreous green, very large; elytra densely confusedly punctate; intervals aciculate. (Southern Calif., Mex.) .... **L. behrensi** *Harold.*
  Black; elytra green or blue, finely irregularly punctate. (Tex., Ariz., Mex.) **L. haldemani** *Rogers.*
Elytra vittate.
  Thorax immaculate.
    Æneous; elytra yellow, irregularly bigeminately punctate, with four interrupted æneous vittæ. (Tex., Ariz., Mex.).... **L. lineolata** *Stål.*
    Æneous black; ventral surface and legs pale; elytra regularly striate with a narrow dorsal and a marginal vitta yellow. (Tex., Mex.) **L. dahlbomi** *Stål.*
    Rufescent; elytra pale, with suture, two discal vittæ and margin piceous. (Lower Cal., Ariz. Collection Ulke.).... **L. peninsularis** *Horn.*
    Black; elytra pale, regularly striate, each with four dark vittæ. (N. Mex., Mex.)............................. **L. melanothorax** *Stål.*
  Thorax maculate.
    Ventral surface and legs entirely black.
      Elytra with suture, five vittæ and epipleura black; striæ of confused punctures. (Southern Calif., Mex.) **L. undecimlineata** *Stål.*
    Ventral surface and legs yellow, maculate with black.
      Elytral striæ of confused punctures; suture and five vittæ black.

free spot; the fourth strongly abbreviated, with a free spot at the middle of the sides. (Southern States to Mont. and Ariz.

Z. exclamationis *Fabricius.*

Oval, brown, smaller; elytra pale, with sutural and subsutural vittæ confluent, the second and third joining at two-thirds the length, a free spot near apex and a very short fourth vitta behind the humerus; epipleura pale. (Kans., Neb., Mont., Dak.) .... **Z. conjuncta** Rogers.

Like previous form but generally paler in color and the elytral vittæ broken up into spots. (Kans., Dak., Mont.) .... **Z.** var **pallida** *Bland.*

Oval, brown, of medium size; elytra pale with brown vittæ, the subsutural united with the sutural; two broad discal vittæ generally connected near apex the fourth vitta entirely wanting; epipleura and the margin posteriorly brown. (Ariz., N. Mex., Colo., Utah) .... **Z. continua** *Leconte.*

(syn. *fasciatipennis* JACOBY.)

Thorax unicolorous, brown or æneous.

Globosely oval, brown, slightly bronzed; elytra pale with dark vittae; subsutural united with sutural, two confluent discal vittæ, no isolated spots. epipleura pale with dark margins. (East of Rocky Mts.).

Z. suturalis *Fabricius.*

Like previous form, but the subsutural and discal vittæ free, var. **casta** *Rogers.*[*]

Globosely oval, brown, slightly bronzed; elytra pale with narrow vittæ; the subsutural free, slightly abbreviated; the second and third sinuous, abbreviated and united at two-thirds the length; the fourth very short, confluent at base with the third; two or three isolated spots posteriorly; epipleura pale with brown margins. (Tex., Kans., Ariz.)

Z. disrupta *Rogers.*

Like previous form, but smaller and still more globose; the second vitta twice interrupted, the fourth represented by a spot only. (Tex., Col.)

Z. heterothecæ sp. nov.[†]

Oval, dark æneous; elytra pale with a sinuous vitta extending from the humerus to near the suture one-fourth from apex, thickened at middle, hooklike at apex and with a short humeral stripe attached to its base; an oval spot near the scutellum and three smaller ones posteriorly near the lateral margin; sutural vitta striatopunctate, trifid at base; epipleura and margin pale. (Tex.; Southern Ariz., Mex.)................ **Z. malvæ** *Stål.*

Oval, ferruginous; elytra yellow with markings as in *Z. malvæ*, but subsutural vitta free for at least half the length and the epipleura margined with brown. (Ariz., N. Mex.)..................... **Z. tortuosa** *Rogers*

Oval, brown, more or less bronzed; elytra pale with a broad sutural vitta, ramified before and behind the middle, a broad arcuate band from the humerus to behind the middle, a small round spot on the side of the disc and another one near apex; epipleura and an elongate marginal spot just behind the middle also dark. (Southern Ariz.)....... **Z. opifera** *Stål*

---

[*] *Chrysomela festiva* FABRICIUS. "Nigroænea, elytris lineis tribus suturaque ntica flavis. Statura *C. fastuosæ* at duplo minor. Habitat America." Suffrian uggests that this may be identical with *casta* Rogers, but I can not see that the escription fits this or any other North American species.

[†] Mr. E. A. Schwarz informs me that he collected this species in abundance at olumbus, Texas, feeding on the leaves of the Composite plant, *Heterotheca scabra.*

Elongate oval, feebly convex, brown, slightly bronzed; elytra pale with a broad sutural vitta, epipleura and spots æneous; two larger basal spots, the exterior one emarginate behind, a small spot at the suture before middle, a larger one, strongly arcuate, behind the middle and many smaller ones posteriorly. (Tex., N. Mex., Ariz.).............. **Z. piceicollis** *Stål*

Elongate oval. feebly convex, greenish black. Elytra pale; epipleura, a broad sutural vitta, twice ramified posteriorly, an oblique humeral vitta, connected with the sutural band at middle, an oval spot between humerus and scutellum, four or five discal spots on posterior half and the lateral margin behind the middle, æneous. (Mex., Ariz. Collection Ulke.) **Z. signatipennis** *Stål*

Genus **Calligrapha** *Erichson*.

Elytra vittate.

Thorax uniformly brown. Epipleura dark.

Oval, ferruginous. Last joint of palpi strongly dilated. Sides of thorax coarsely punctate. Elytra yellow with broad sutural and discoidal ferruginous bands; the latter longitudinally more or less divided by yellow. (East of Rocky Mts.) .... **C. lunata** *Fabricius*.

Oval, convex, brown, slightly bronzed. Elytra pale with a broad sutural and dorsal vitta bronzed, the latter angularly incised at middle exteriorly. (East of Rocky Mts.).............. **C. similis** *Rogers*.

Like the preceding but globosely oval, with the sutural vitta truncate at base and dilated at apical third and the discal vitta abbreviated posteriorly. (Kans., Neb.).............................. **C. incisa** *Rogers*.

Regularly oval, convex, brown. Elytra pale; an entire sutural and two discal vittæ of subequal width and parallel, brown; the inner discal vitta somewhat shorter. (Capron, Fla.). . **C. cephalanthi** *Schwarz*.

Thorax brown with apical and lateral margin pale. Epipleura pale.

Oval, convex, dark brown. Elytra pale with sutural and one discal vitta

Thorax entirely green.

Oval, green. Elytra pale with a broad, three or four times ramified sutural vitta; a larger curvate humeral and many smaller spots, one of which is placed close to lateral margin at middle. (East to Neb. and Tex.) **C. scalaris** *Leconte.*

Like preceding but elytral markings narrow and subsutural stripe free. (Eastern States to Neb.)..**C. philadelphica** *Linné.*

Markings broader, especially the humeral stripe..var. **spireæ** *Say.*

Thorax pale, at least in part, lateral margin of elytra unspotted.

Oval ferruginous. Thorax pale with ferruginous spots. Elytra with numerous small black spots. (Mo. to Wash.) **C. multipunctata** *Say.*

Oval, green. Thorax green or brown with pale apical and lateral margins. Elytra pale with slender sutural and subsutural lines and numerous small spots, green. (Eastern States to Ore.)........................**C. bigsbyana** *Kirby.*

Legs and epipleura black.

Oval, convex, greenish black. Elytra with heavy black markings connected, and enclosing angular pale spots. (Canada.) **C. pnirsa** *Stål.*

Epipleura of prothorax canaliculate.

Epipleura of elytra pale.

Oval, convex, bluish black. Elytra pale with narrow black markings; sutural, subsutural and two parallel sinuous stripes from the humeral region to beyond middle, the exterior one connected with a humeral spot; several smaller spots posteriorly. (El Paso, Tex., Ariz., N. Mex., Mex.)......**C. dislocata** *Rogers.*

Like the preceding but the markings of elytra much broader and the subsutural confluent with the sutural stripe. (Pac. States to Neb.)............................**C. sigmoidea** *Leconte.*

Epipleura of elytra black.

Legs red.

Elongate oval, bluish black. Elytra pale with strong black markings; a sutural vitta trifid in front; a long stripe from the humerus arcuate towards suture before the middle, abruptly parallel with suture to behind middle and again arcuately bent and reflexed towards the margin; an oval spot between the humerus and scutellum, a V-shaped one at apex and several on the sides of the disc; also a marginal spot at middle. (Ariz., N. Mex.)..............**C. serpentina** *Rogers.*

Legs black.

Very small, globosely oval, black. Elytra with a broad black sutural vitta, abreviated at base, and with about 9 large pale spots surrounded by black rings; a small marginal spot at middle. Kans. (Collection Ulke), Mex. **C. multiguttata** *Stål.*

Size, form and elytral markings resembling *C. scalaris*, Leconte but lateral margin unspotted. (Mex.) (Ariz., *fide* Crotch.) .... **C. sylvia** *Stål.**

Genus **Chrysomela** *Linné.*

Marginal groove of thorax not reaching to apex.
- Ovate, green or blue, apterous. Elytra sulcate, finely punctate in regular striæ. (Alaska) .... **C. subsulcata** *Mannerheim.*
- Oblong, black, winged; elytra margined with fulvous, intervals irregularly punctate. (Colo., Kans., Neb., Dak.) ...... **C. flavomarginata** *Say.*
- Like preceding but without yellow elytral margin. (Col. to Ore.) **C. basilaris** *Say.*

Marginal groove of thorax entire.
- Oval, convex, winged, violaceous; elytra golden green or purple, more or less irregularly striato-punctate. (Tex. to Neb.) ...... **C. auripennis** *Say.*
- Like preceding but entirely bluish black. (Tex., Idaho, Cal.) **C. inornata** *Rogers.*
- Oval, bluish black, apterous. Lateral margin of thorax more incrassate and strongly rounded. (Rocky Mts.) .... **C. montevagans** *Leconte.*
- Globosely oval, æneous black, subopaque, winged. Elytra finely alutaceous between the punctures. (N. Y. to Fla., Tex. and Mo.) **C. subopaca** *Rogers.*

◆

THE DOG'S HEAD BUTTERFLY ON STATEN ISLAND.

BY W. T. DAVIS.

In the "Canadian Entomologist" for last July and August the fact is recorded that *Colias cæsonia*, the Dog's Head butterfly, had been taken last June near Toronto and in Southern Manitoba. This southern butterfly has never been recorded from the vicinity of New York City

DIABROTICA IN NEW MEXICO.

The Table of the distribution of *Diabrotica* given by Prof. Webster on p. 67 has gone wrong either in copying or printing. The altitude of the Mesilla Valley is 3800 ft. *D. tricincta* was not taken at Juarez, but in the Mesilla Valley; Mr. Wickham says it is also found in Northern Arizona, and at Albuquerque, N. M. *D. longicornis* (not *lemniscata*) was found by Mr. Wickham, at Albuquerque. *D. lemniscata* is from Socorro (Snow). T. D. A. COCKERELL.

◆

NOTE ON SAMIA CALIFORNICA.

By A. R. GROTE.

Mr. Beutenmüller writes to me that, as to *Samia californica*, this name is the first published (1865) with description and must have preference for the species. Dr. Behr writes to Mr. Beutenmüller that the name "*ceanothi*" was by mistake left out of the original description, and that no such name as "*Samia rubra* Behr," to which specific title Neumoegen and Dyar give preference, was ever published by him. I stated in the "*Saturniiden*," that no description under the name "*rubra*" is known to me. The descriptions of the species under the name "*ceanothi*" (1868) and "*euryalus*" (1875) are both later than its description as *californica*; although the two first names were in use in collections, as it now appears, they were neither of them sanctioned by description at the time my original paper appeared.

◆

NEW SPECIES OF INSECTS TAKEN ON A TRIP FROM THE MESILLA VALLEY TO THE SACRAMENTO MTS., NEW MEXICO.

By T. D. A. COCKERELL.

From September 27 to October 7, 1896, the writer went on a trip to the Sacramento Mts., in company with Prof. C. H. T. Townsend. Among the insects obtained are several new species, some of which are described herewith:

COCCIDÆ.

Icerya (Crypticerya) townsendi, sp. nov.

♀. Long. 5, lat. 4, alt. 3.5 mm., subglobose, dark pink becoming dark purplish, thinly covered with white mealy secretion, which forms dorsal and sublateral longitudinal series of wart-like white prominences. Viviparous (ovoviviparous), the young leaving the egg before being excluded from the body of the parent.

Legs and antennæ dark brown, the distal margins of the antennal joints broadly pallid. Antennæ 11-jointed, slender, joints 1, 2 and 11 subequal in length and longest, the others subequal and shorter, 3 about as long as broad; 4 and 5 shorter than 3 and broader than long, 5 shortest; 6 to 10 longer than broad. 3 may be as long as 2. Femur rather stout. Tibia longer than femur. Tarsus curved, about half as long as tibia. Claw pallid, broad, narrowing to a point. Mouth parts small.

Larva at period of hatching 1 mm. long, bright red, sparsely powdered with white meal, legs and antennæ black. Antennæ 6-jointed, 6 much longest; formula 6(21)·3(54). End of body with 6 long hairs on each side, of which the first three and last are about equal, and the other two very much longer. The two especially long ones are very close together.

Habitat: Mescalero Reservation, a short distance below the Agency, at base of stems of *Gutierrezia sarothræ*, October 2. *Orthezia nigrocincta* Ckll., occurred in numbers on the same plants. On July 26, 1892, Prof. Townsend found a single specimen of *Icerya* on *Gutierrezia microcephala* about 10 miles south of Navajo Springs, Arizona. I did not see the specimen which was sent to Dr. Riley, but it was very possibly *I. townsendi.*

A few weeks ago Prof. Townsend discovered at Mesilla an *Icerya* on stems of *Pluchea borealis*, while collecting *Phenacoccus helianthi*, which abounds on the same plant. This is larger than *I. townsendi* (long. 6.5, lat. 5.5, alt. 5 mm.), dark purplish grey, speckled with white secretion, with very distinct longitudinal rows of yellow-white mealy protuberances. These wart-like protuberances number about 8 in the dorsal row; the sublateral row is anteriorly single, of three, then giving way to two rows, of about 6 each. There is also a lateral row of about 9. The legs and antennæ resemble those of *townsendi.* On breaking open the body, I found a quantity of orange-yellow fluid, in

No lateral tufts, but sides very mealy; thick caudal tufts like those of *D. virgatus*, not very long. Antennæ very slender, 8-jointed. Formula 83(12)(456)7. All the joints longer than broad. 8 with three whorls of hairs. 3 very slender, nearly as long as 8. 1 longer than its breadth at base, 8 about or nearly as long as 6+7. Joints with sparse whorls of long hairs. Color of antennæ brown. Legs ordinary, small, slender, pale brown. Tarsus about half as long as tibia. Claw short, moderately curved. Tarsal digitules extremely slender, filiform, with minute knobs. Digitules of claw about as long as claw, stout, bulbous at base. Tibia with four strong bristles on outer margin. Caudal tubercles low, rounded, with a rather long bristle, some short bristles, and a couple of short stout spines. The ♀ does not stain the liquid in which it is boiled. Young larva light yellow.

Habitat: Organ, N. M., 5,100 ft., in great numbers at bases of leaves of *Dasylirion wheeleri*. The larvæ live at the extreme base of the leaf, which is pallid; the adults a little further up. This is a typical *Dactylopius*, and quite different from *D. olivaceus* Ckll., which lives "in cavities in leaves" of *Yucca*.

Dactylopius gutierreziæ, sp. nov.

♀. Slate color, small (when boiled and flattened under cover-glass, long. 2, lat. 1 mm.), forming a long firm snow-white ovisac, 4 to 6 mm. long, about 1 mm. broad, on the narrow leaves of the *Gutierrezia*.

♀. Elongato-oval, does not stain the liquid in which it is boiled; antennæ and legs pale. Antennæ 8-jointed, of the usual Dactylopiine type. Formula 812(37)(46)5. 5 is broader than long. 3 is conspicuously shorter than 2. 1 is very large. 8 has three whorls of hairs. Anal ring with the usual 6 hairs. Caudal tubercles very low, with the usual hairs, the longest a little longer than those of the anal ring. Legs ordinary. Trochanter with a rather short bristle. Tibia almost as long as femur, tarsus rather more than half as long as tibia. Claw small, not much curved. Tarsal digitules filiform, without knobs. Digitules of claw stout, but very short, shorter than claw.

Habitat: Mesilla Valley between Las Cruces and Organ, abundant on *Gutierrezia sarothræ*, var. Also abundant on *G. sarothræ* near the Muscalero Agency, at the type-locality of *Icerya townsendi*. This is not a typical *Dactilopius*, but is allied to such forms as *D. townsendi* and *D. steelii*. Its ovisac is exactly like that of *Phenacoccus*. It has a chalcidid parasite.

Ceroplastes irregularis *Ckll.*, var. **rubidus**, var. nov.

♀. Scale very dark madder red or pinkish-brown, with the short dorsal line of secretion showing up conspicuously white. Margin of waxy scale dull white. Boiled in caustic soda, the liquid is turned claret color.

Habitat: Whitewater, abundant on *Atriplex canescens*. At this time (beginning of October) the scales were full of the pink eggs. The dark pink-brown wax of this insect is very peculiar, and was perfectly constant in the locality, the typical form not being observed anywhere in the vicinity.

CECIDOMYIIDÆ.

Cecidomyia neomexicana, sp. nov.*

♂. Length 3 mm. Dark slate grey. Sutures of abdominal segments reddish two longitudinal hairy bands on thorax; abdomen hairy. Halteres dull white. Antennæ 2+12 jointed, very dark grey, sometimes pale; legs grey, paler. Wings greyish, venation normal; vii (following Comstock's nomenclature) very weak; fold representing v distinct, iii 2+5 reaching margin a little above tip of wing; lower margin with a fringe of hairs. Antennal joints elongate, cylindrical, not moniliform with sparse whorls of short hairs; joint 3 much longer than 4. Pupa-shell red-brown.

Galls numerous, many together, on twigs of *Atriplex canescens*; globular, 8 to 12 mm. diam., yellowish-white. Composed of loose felted hairs, so that the outside is soft, wool-like in appearance, yielding to pressure. The cell within is green, not at all woody. Flies issued from September 30 to October 1.

Habitat: Organ, N. M., 5100 ft. Also common on Tularosa Creek. The fly resembles *C. atriplicis*, Twns., but the gall is quite different. Prof. Townsend has known the galls of *C. neomexicana* for several years, but had failed to obtain the fly.

APIDÆ.

Perdita townsendi, sp. nov.

♀. Length about 7.5 mm., shining, fairly pubescent. Head dark prussian green, area between clypeus and antennæ black. Vertex, occiput and cheeks with conspicuous white pubescence, sides or front also pubescent. Front minutely granular, with sparse small punctures. Clypeus, sparsely but distinctly punctured, moderately high, rounded at top, notched. Eyes very dark brown. Clypeus except the usual black dots, lateral face-marks, two spots representing supraclypeal marks, scape except a black streak at and above, and basal half of mandibles, primrose yellow. Lateral face-marks shaped almost exactly as in *P. rectangulata*, but separated from clypeus by a black line, and the narrowing about level with the lower part of the antennal sockets, the linear upward extension very short. Flagellum dark sepia brown above, yellow beneath. Thorax with moderately band of light yellow, broken in the middle. Venter very pale yellow without marks. The mandibles are notched within near the end.

♂. Length about 6.5 mm. The yellow color darker; flagellum orange beneath. Margin of stigma and adjacent nervures brownish, marginal cell therefore very distinct. 3d discoidal excessively weak. Face all yellow beneath level of antennæ, except clypeal dots, and small triangles at junction of clypeus, supraclypeal mark, and dog-ear marks. Supraclypeal mark slightly notched or depressed in median line above, not at all produced upwards. Lateral marks running obliquely from antennal sockets to a point on the margin of the eye, forming an angle of about 45° thereat. Mandibles yellow except tips. Labrum yellow with a dark spot on upper border medially. Prothorax yellow with a dark transverse band. Legs wholly yellow, except a dark stripe on hind tibiæ, and dark last three joints of hind tarsi. Abdomen with five bands instead of four, some presenting square sublateral bulgings on anterior edge, not always obvious.

Habitat: White Sands by Whitewater, N. M. Many of both sexes found by Prof. Townsend visiting flowers of *Bigelovia*, October 6th. On the same day we found a purple-flowered *Aster* at Whitewater visited by *P. townsendi*, 1 ♂, 1 ♀, one *P. fallax*, Ckll., and one *P. semicrocea*, Ckll. The ♂ *townsendi* from the *Aster* has the abdomen more darkened, so that it might be said to be black with light bands.

P. townsendi is allied to *P. bigeloviæ*, but very distinct. The ♀ is larger, and the femora are entirely yellow, etc. In my table of *Perdita* (Proc. Phil. Acad., 1896) it runs down to 77. The ♂ in the table runs down to 42. ♂ *bigeloviæ* differs at once from it by the yellow of the face extending above level of antennæ in the median line.

Perdita stottleri, sp. nov.

♀. About 6 mm. long. Differs from *townsendi* in its small size, and in having the front femora with a large black patch behind, the middle femora with a black speck near the end, and the hind femora with the upper hind edge broadly black for the apical three-fifths. The clypeus is hardly so high as in *townsendi*, and the lateral face-marks run gradually to a point, the angulation being barely perceptible. The supraclypeal spots are present as in *townsendi*.

Differs at once from *bigeloviæ* by the pale yellow venter of abdomen, as in *townsendi*, that of *bigeloviæ* being dark brown. The abdomen above also is marked just as in *townsendi*. The femora in *bigeloviæ* are all black except at their distal ends, in *stottleri* only marked with black, in *townsendi* without any black.

Habitat: By Tularosa Creek at the store on the edge of the Mescalero Reservation, October 1st. One specimen on flowers of *Bigelovia graveolens* var. *glabrata*,* a few feet within the boundary-line of the reservation. The species is named after Lieut. Stottler, the Indian Agent, whose work among the Mescalero Apaches excited our strongest admiration. *P. stottleri* is very near to *townsendi* (which occurs on a different *Bigeloviæ*), but six ♀ *townsendi* were compared with it, and none show any tendency to intergrade.

---

* The *Bigelovia graveolens* var., along Tularosa Creek is very attractive to flies. Prof. Townsend will report elsewhere on those of the families in which he is inter

Perdita chrysophila, sp. nov.

♂. Length 5.5 mm. Head and thorax very dark bluish green, scutellum and clypeus black, supraclypeal area æneous. Abdomen piceous-brown above and below, the hind margins of the segments rather broadly hyaline; apex orange. Labrum dark brown. Mandibles black with the tips dark rufous. Scape black, flagellum very dark brown. Tegulæ pale brown. Wings milky-hyaline; costal nervure, margin of stigma, and radial nervure sepia-brown; the other nervures pallid. Pubescence dull white. Legs piceous black, the tarsi becoming brown.

Head very large, subquadrate; cheeks unarmed, shining, not very pubescent. Front shining, microscopically tessellate, with distinct but very sparse punctures. Face tolerably hairy. Thorax shining, tolerably hairy. Mesothorax and scutellum with distinct but very sparse punctures. Metathorax shining, very obscurely sculptured. Marginal cell with its poststigmatal portion much the longest; its end squarely truncate. Second submarginal narrowed more than half to marginal. Third discoidal excessively weak or wanting.

Habitat: Organ, N. M., 5100 ft., September 28th, on flowers of *Verbesina encelioides*, one taken others seen. Near to *P. arcuata* Fox, to which it runs in table of *Perdita*, but it does not have the pale color on mandibles and anterior tibiæ.

Two other species of *Perdita* were taken on the trip, namely: *P. albovittata*, Ckll., Parker's Well, October 7th. Three ♀ ♀ visiting flowers of *Baileya multiradiata*.

P. sphæralceæ Ckll. Whitewater, October 6th, one ♀ on *Sphæralcea angustifolia*. Organ, September 28th, three ♀ ♀ at flowers of *Mentzelia*, with no *Sphæralcea* near. The occurrence of this species on

ALEURODIDÆ.

Aleurodes berbericola sp. nov.

Empty pupa-case .75 mm long, oval, colorless, without a fringe, margin radiately striate; vasiform orifice an elongated triangle, the base cephalad, the sides nearly twice as long as the base; operculum hemispherical or semilunar, its base being concave; lingua elongate subspatulate, extending nearly as far beyond the operculum as the breadth of the latter, but not to the tip of the orifice. No conspicuous submarginal orifices.

Adult ♀ .60 mm. long, anterior wing 1.25 mm. Head and body entirely deep orange yellow, legs pale lemon yellow, wings pure white without marks. Eyes jet black, each one completely divided. Genitalia ordinary, the usual two bristles on each side of the end of the abdomen.

Habitat: On a shrubby *Berberis*, the pupæ on the leaves, the adults flying about the plants. Mescalero Reservation, Tularosa Creek, below the Agency, October 2d.

This is surely a distinct species, though the adult is much like several others. The vasiform orifice, etc., present some similarity to those of the larva of *A. decipiens* Maskell, but in other respects there is no resemblance between the species.

◆

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING ON MARCH 17, 1896.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Eleven members present.

Mr. Birnbaum read a paper on Phosphorescent Insects and Plants, illustrated by insects and figures. Discussion by Messrs. Dyar, Loos, Beutenmüller and Zabriskie. Mr. Beutenmüller exhibited some branches from the United States of Colombia with the borings of a large carpenter bee with live larva and imagos, the tunnels being about an inch in diameter.

MEETING OF APRIL 7, 1896.

Held at the American Museum of Natural History.

President Zabriskie in the chair. Eleven members present.

Dr. Love spoke on the larva of the Bot-fly.

Dr. Lagai exhibited some entomological preparations, preserved in formaline, which included some interesting life-histories of insects. After discussion the meeting adjourned.

MEETING OF APRIL 22, 1896.

An auction sale of insects was held for the benefit of the JOURNAL. The specimens for this purpose were donated by Mrs. Slosson, and Messrs. Palm, Bradford, Dyar, Ottolengui, Schaeffer, Münch, Loos and Joutel. Many of the species brought good prices; the total amount realized being $77.35. Dr. Ottolengui and Mr. Beutenmüller acted as auctioneers.

MEETING OF MAY 5, 1866.

Held at the American Museum of Natural History.

In the absence of the President, Mr. Beutenmüller was elected chairman *pro tem*. Nine members present.

Mr. Beutenmüller spoke of the 4th of July field meeting to be held at Hemlock Falls, N. J., to which the Society had been invited.

Dr. Love moved to appoint a committee of three, of which the chairman of this meeting shall be chairman. Accepted.

Mrs. Louise Moschell was proposed as an active member by Mr. L. H. Joutel.

Mr. Dyar exhibited examples of the Callemorphas of our fauna and showed some larva of *C. falvicosta* from Maryland.

Dr. Love gave a few notes on the field meeting, made by the Society to St. Mary's Lake.

Adjournment.

MEETING OF MAY 19, 1896.

Held at the American Museum of Natural History.

President Zarbriskie in the chair. Eleven members present.

Mr. Beutenmüller spoke on the advisibility of sending the JOURNAL to the different Entomological Societies with a view to exchange. After

INDEX TO VOLUME IV.

Acamptus rigidus, larva of, 122
Acanthoderes, food of, 78
Acidalia contiguaria, 111
Aclytia terra, sp. nov., 133
Agalena californica, sp. nov., 89
  pacifica, sp. nov., 89
Agrœca minuta, 190
Agronoma, note on, 85
Aidos castrensis, sp. nov., 56
Alypia langtoni, note on larva of, 50
Aleurodes berbericola, sp. nov., 206
Amara, synopsis of, 33
  species of, 35
Amaxia dyuna, sp. nov., 135
  juvenis, sp. nov., 135
Anthocharis belia, 109
  notes on, 114
Anthophilax mirificus, 77
Anisota consularis, sp. nov., 200
  larvæ of, 201
Apatela, notes on, 98
  funeralis, 81
Apatelodes corema, sp. nov., 53
  sericea, sp. nov., 53
  velutina, sp. nov., 53
Apatura, notes on, 116
Argynnis, notes on, 115
Argyrœides sanguinea, 132
Arhopalus fulminans, 76
Arpia, gen. nov., 148
  janeira, sp. nov., 148
  xanthoptera, sp. nov., 148
Artace manoba, sp. nov., 145
Asemum atrum, 74
  mœstum, 74
Ataxia crypta, 80
Atimia confusa, 77
Attelabus rhois, 96
Attus palustris, 192
Atypoides californica, sp. nov., 88
Badister, synopsis of, 47
Banks, D., articles by, 88, 190, 193
Bellamira scalaris, 77
Bertholdia, gen. nov., 137
  albipuncta, sp. nov., 137
Beutenmüller, W., articles by, 73, 146
Cacoplia pullata, 78
Callichroma splendidum, 75
Callidium, food of, 75
Callidryas sennæ. 114
Calligenia marmorata, sp. nov., 151
  erminea, sp. nov., 151
Calligrapha, synopsis of, 198
Calloides nobilis, 76
Caloptenus italicus, 20
Carama grisea, sp. nov., 57
  flavescens, sp. nov., 57
  parva, sp. nov., 57
Castnia corrupta, sp. nov., 147
  granivora, sp. nov., 147
  veraguana, sp. nov., 147
Castrica, gen. nov., 136
  oweni, sp. nov., 136
Catocala, notes on, 98
Cerambycidæ, food of, 73
Cecidomyia neomexicana, sp. nov., 203
Cemonus inornatus, larva and pupa of, 159
Ceratinopsis interpres, 191
Ceroplastis irregularis, var. rubidus, var. nov., 203
Chætoloma dissimilis, sp. nov., 141
Chalybion cœruleum, larva of, 156
Charidea katima, sp. nov., 133
Chion cinctus, 75, 75
Chionobas, note on, 117
Chlorospinus ænetus, sp. nov., 131
Chrysomela, synopsis of species, 200
  synopsis of genera, 195
Chrysophanus, notes on, 117
Circotettix verruculatus, 17
Citheronia arœ, sp. nov., 59
  azteca, sp. nov., 59
Cockerell, articles by, 200, 201
Cœlotes longitarsis, 191
Colabata dora, sp. nov., 52
Coleoptera, N. E. America, 33
Colias, notes on, 114
  cæsonia, 200
Cornicularia minuta, 90
Cosmosoma dukinfieldia, sp. nov., 132
  durca, sp. nov., 132
  lucia, sp. nov., 132
Crambidia parvita, sp. nov., 151
Criocephalus nubilus, 74
Crustulina guttata, 91
Cyclara, gen. nov., 57
  ovata, sp. nov., 57
Cyllene, food of, 76
Cyrtinus pygmæus, 78
Cyrtophorus verrucosus, 77
Clytanthus albofasciatus, 77
Dactylopius dasylirii, sp. nov., 202
  gutierreziæ, sp. nov., 203
Dalcera citrina, sp. nov., 57
  obscura, sp. nov., 57
Danais strigosa, 115
Dectes spinosus, 79
Dendrolimus howardi, sp. nov., 22
  life-history of, 24
  synopsis of species, 23
Desmocerus, food of, 77
Deva purpurigera, larva of, 145
Diabrotica, notes on species of, 67, 200
Dianthœcia carpophaga, 111
Dicælus, synopsis of, 44, 45
Dictyna, 191
Diplochila, synopsis of, 43
Dorcaschema, food of, 78
Dirphia bertha, sp. nov., 60
  taglia, sp. nov., 60
Distenia undata, 77
Dryobius sexfasciatus, 75
Dyar, H. G., articles by, 1, 22, 68, 72, 87, 92, 125, 145, 166, 167
Eacles masoni, sp. nov., 154

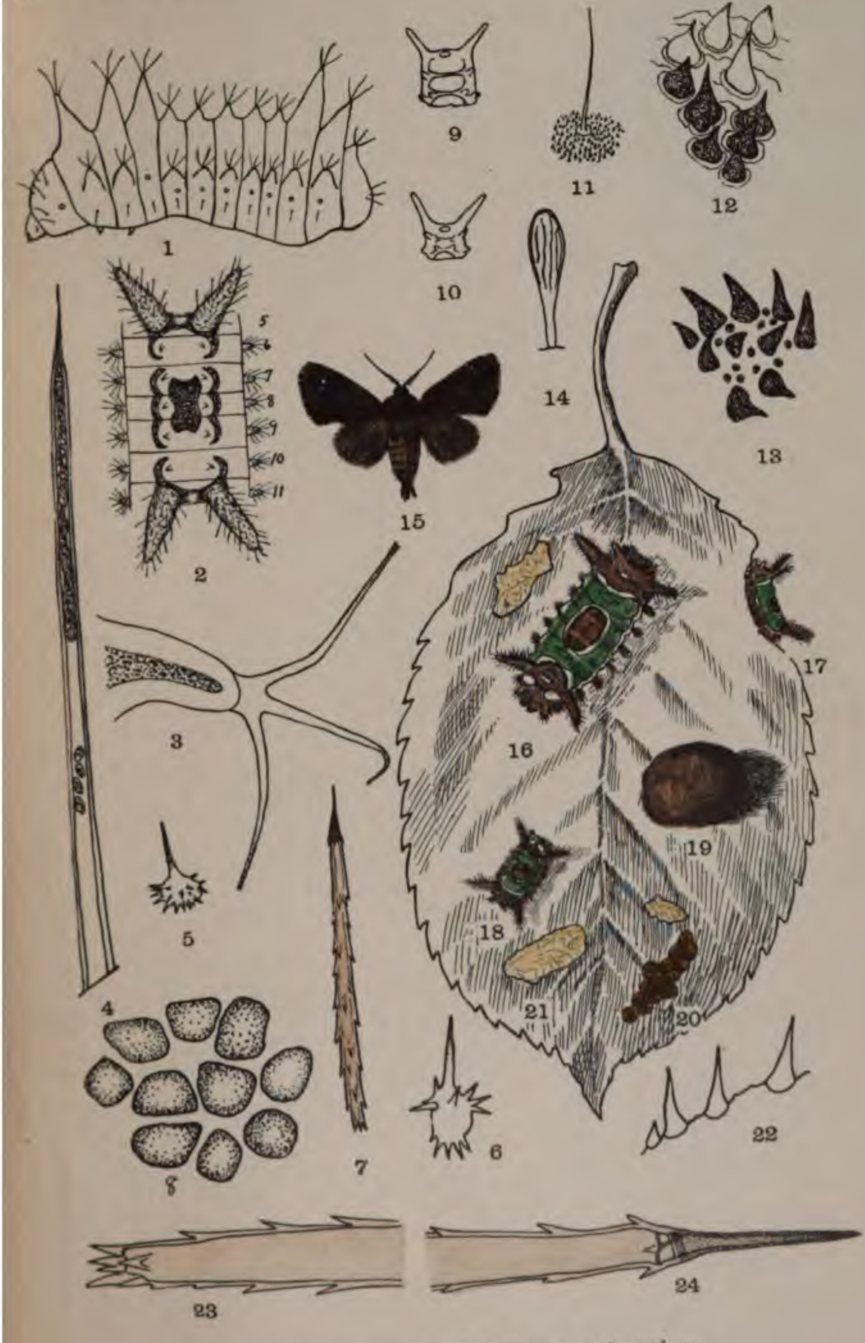
Eburea 4-geminata, 75
Elaphidion, food of, 75
Enæmia crassinervella, note on, 86
Encoptolophus sordidus, 19
Epeira excelsa, sp. nov., 90
Ephialtias tryma, sp. nov., 154
Ergates spiculatus, 73
Erithales capsica, sp. nov., 134
Eucreon amadis, sp. nov., 133
  cinctum, sp. nov., 134
  patrona, sp. nov., 134
  velutina, sp. nov., 134
Euclea delphinii, life-history of, 125
Euderces picipes, 77
  pini, 77
Eugnatha straminea, 191
Euhalisidota sablona, sp. nov., 140
Eulimacodes scapha, life-history of, 172
Eupoeya jamaicensis, sp. nov., 57
Eupogonius, food of, 80
Eupyra albicincta, sp. nov., 131
  ferens, sp. nov., 131
  sylva, sp. nov, 131
Eurata helena, sp. nov., 130
  maritana, sp. nov., 130
Fox, W. J., article by, 10
Gaurotes cyanipennis, 77
Gayenna fraterna, 190
Gloveria, synopsis of species of, 23
Gomphus scriptus, sp. nov., 194
Gnophos obscuraria, 111

Heterocera, New Species of, 51, 130
Hetœmis cinerea, 78
Hexarthrum ulkei, 97
Hipparchia ridingsii, 116
Hippopsis lemniscata, 80
Homoæsthesis emarginatus, 74
Hoplosia nubila, 80
Hyctia pikei, 190
Hydrias amaryllis, sp. nov., 143
  boresa, sp. nov., 144
  chamycuros, sp. nov., 144
  chera, sp. nov., 144
  funerea, sp. nov., 144
  marna, sp. nov., 143
  mediana, sp. nov., 144
  venalia, sp. nov., 143
  vitripuncta, sp. nov., 143
Hylotrupes, food of, 74
Hymenorusobscurus, larva of, 121
Hyperplatys, food of, 79
Icerya townsendi, sp nov., 201
Icius diminutus, sp. nov., 192
Illice subfulgens, sp. nov., 151
Ipochus fasciatus, 78
Labidomera, synopsis of, 195
Lampyris, phosphorescence of, 63
Larinia borealis, 191
Laspeyria, note on, 85
Lepinotarsa, synopsis of, 196
Leptostylus, food of, 79
Leptura, food of, 77
  emarginarta, 95
Lepturges, food of, 79
Libythea, notes on, 117
Licinus silphoides, 47

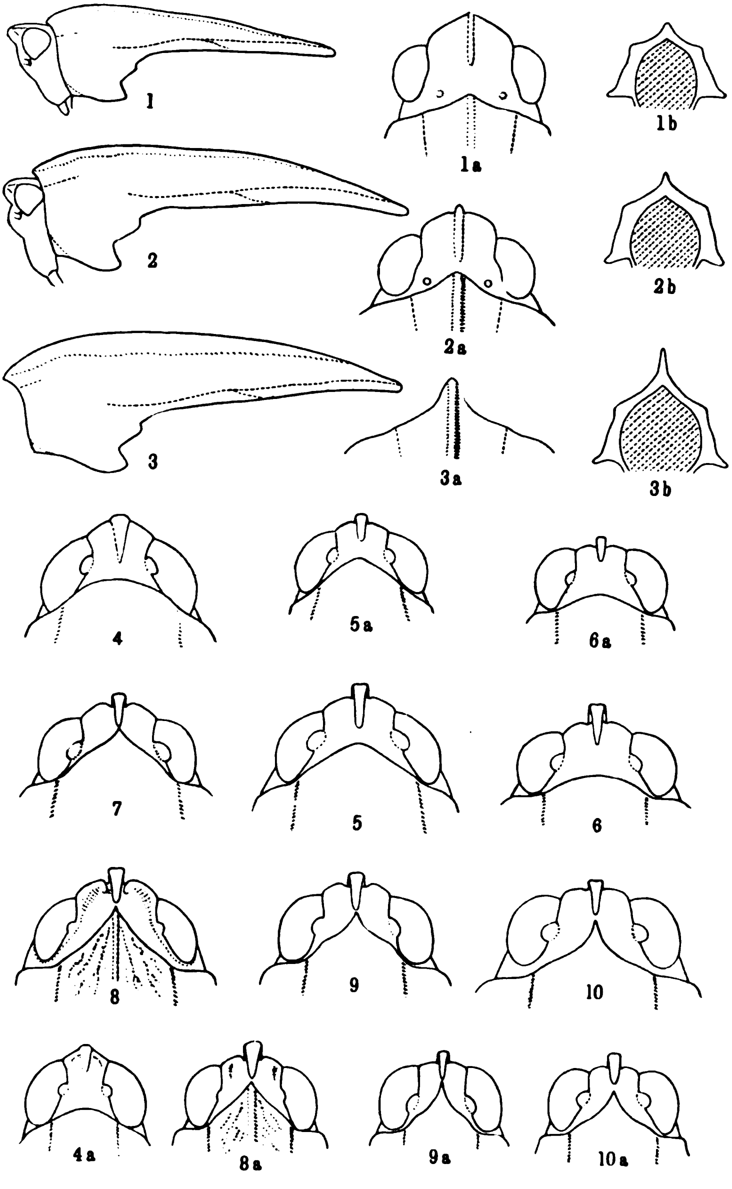
Mazæras francki, sp. nov., 141
  rusca, sp. nov., 141
Megaderus bıfasciatus, 76
Mecas inornata, 81
Mecostethus, 18
Megalopyge fieldia, sp. nov., 58
  lapena, sp. nov , 58
  trujillo, sp. nov., 58
  vipera, sp nov., 58
Megeleates sequoiarum, larva of, 118
Megobrium edwardsii, 75
Melitæa, notes on, 116
Meracantha contracta, larva of, 119
Microclytus gazellula, 77
Microneta viaria, 191
Mieza igninix, 86
Misumena californica, sp. nov., 91
  pictilis, sp. nov., 91
Molorchus bimaculatus, 65
Monilema, food of, 78
Monohammus, food of, 78
Morse, A. P., articles by, 16, 20, 49
Motada amaryllis, sp. nov., 142
  bergi, sp. nov., 142
  dukinfieldia, sp. nov., 142
  honora, sp. nov., 142
  paula, sp. nov., 142
  variegata, sp. nov., 143
Nemobius ambitiosus, 104
  aterrimus, sp. nov., 105
  canus, sp. nov,, 103
  carolinus, 107
  cubensis, 105
  distinguendus, sp. nov., 101

  garuba, sp. nov., 152
  hermana, sp. nov., 152
  natama, sp. nov., 153
  pantherea, sp. nov., 152
  rodea, sp. nov., 152
Notodontidæ, desiderata of, 93
Nysson, synopsis of N. Am. species, 20
  simplicicornis, sp. nov., 15
  subtilis, sp. nov., 14
Oberea, food of, 81
Ocha drucei, sp. nov., 144
Odozana cuprea, sp. nov., 150
  olivacea, sp. nov., 149
  pascuala, sp. nov., 150
  varda, sp. nov., 149
Odynerus albophaleratus, larva and pupa of, 163, 164
Œdipoda fasciata, 20
Oeme gracilis, 75
Oiketicus jonesi, sp. nov., 156
Oncideres., food of, 80
Ottolenguia, gen. nov.,
  reticulina, sp. nov., 146
Orgyia falcata, sp. nov., 153
Orthosoma brunneum, 74
Oxyopes salticus, 192
Packard, A. S., articles by, 26, 61, 93, 155
Palustra sericea, sp. nov., 142
Pamphila egeremet, 117
Papilio, notes on, 113
Pardosa brunnea, sp. nov., 192
  littoralis, sp. nov., 192
Passalæcus mandibularis, pupa of, 161
Pelopæus cementarius, pupa of, 157
Pericopidæ, origin of, 68
Perdita chrysophila, sp. nov., 206
  stottleri, sp. nov., 205
  townsendi, sp. nov., 204
Perola platona, sp. nov., 56
  sucis, sp. nov., 56
Perophora deprava, sp. nov., 52
  funebris, sp. nov., 51
  grisea, sp. nov., 52
  melsheimeri, note on, 92
  musa, sp. nov., 51
  nigrescens, sp. nov. 51
  olivia, sp. nov., 52
  pulverula, sp. nov., 52
Phægoptera aurogutta, sp. nov., 141
  chorima, sp. nov., 140
  nexoides, sp. nov., 140
  rizoma, sp. nov., 140
Phasis meridiana, sp. nov., 148
Philoros marita, sp. nov., 133
Philodromus, 191
Phobetron pithecium, life-history of, 178
Phosphorescent Organs of Insects, 61
Photinus, 64
Phyciodes, notes on, 116
Phymatodes, food of, 74
Physocnemum brevilineum, 74
Phyton pallidium, 75
Pieris, notes on, 109, 114
Plectodera scalator, 78
Plagionotus speciosus, 76
Pœcilochroa pacifica, sp. nov., 89
Pogonocherus mixtus, 80
Pompilus funereus, larva of, 155
Prionus, food of, 74
Proceedings, N. Y. Ent. Soc., 50, 95, 207
Prolimacodes, gen. nov., 56
  triangulifera, sp. nov., 56
Prothesima, 190
Prumala, gen. nov., 137
  jamaicensis, sp. nov., 137
Psenocerus supernotatus, 78
Pseudalis, gen. nov., 135
  limona, sp. nov., 135
Purpuricenus humeralis, 76
Pygoctenucha dukinfieldia, sp. nov., 133
Pyrophorus noctilucus, 63
Rhagium lineatum, 77
Rhopalocera, studies of, 107
Rhopalum pedicellatum, larva and pupa of, 162
Rhosus unipuncta, sp. nov., 153
Romaleum atomarium, 75
Saitis minusculus, sp. nov., 193
Samia californica, 201
Sansaptera, gen. nov., 132
  cocho, sp. nov., 132
Saperda, food of, 80
Satyrus, notes on, 117
Schaus, W., articles by, 51, 130, 147
Schizax senax, 76
Scotura nervosa, sp. nov., 154
Scudder, S. H., article by, 99
Sibine auromacula, sp. nov., 56
  extensa, sp. nov., 55
  plora, sp. nov., 55
  stimulea, life-history of, 1
Sisyrosea textula, life-history of, 185
Skinner, H , article by, 107
Slosson, A. T., article by, 86
Slug Caterpillars, N.Y., 1, 167
Smodicum cucujiforme, 74
Sparaloma sexpunctata, larva of, 145
Sphecosoma melisa, sp. nov., 131
Sphex tibialis, larva and pupa of, 158
Spiders, New Species of, 88
Spintharus flavidus, 191
Stigmus fraternus, larva and pupa of, 159
Stenophenus notatus, 76
Synchloe adjutrix, 116
Symphlebia aryllis, sp. nov., 136
Syntomeida broadwayi, sp. nov., 130
  epilais, larva of, 72
Syntrichura drodea, sp. nov., 132
Talara barema, sp. nov., 149
  bombycia, sp. nov., 149
  domina, sp. nov., 149
  grisea, sp , nov., 149
  obscura, sp. nov., 149
  rosacea, sp. nov., 148
  ruficollis, sp. nov., 149
Tarema, gen. nov., 55
  rivara, sp. nov., 55
Tegenaria californica, sp. nov., 90
Tentana triangulosa, 191
Tettiginæ, North American, 49
Tetraopes, food of, 81
Thalesa, gen. nov., 139
Thecla, notes on, 117
Thelosia, gen. nov., 53
  camina, sp. nov., 54
  phalæna, sp. nov., 54
  tropea, sp. nov., 54
  truvena, sp. nov., 54
Theridium globosum, 191
Tillomorpha geminata, 77
Titya lanuginosa, sp. nov., 143
Tmeticus, Long Island Species of, 191

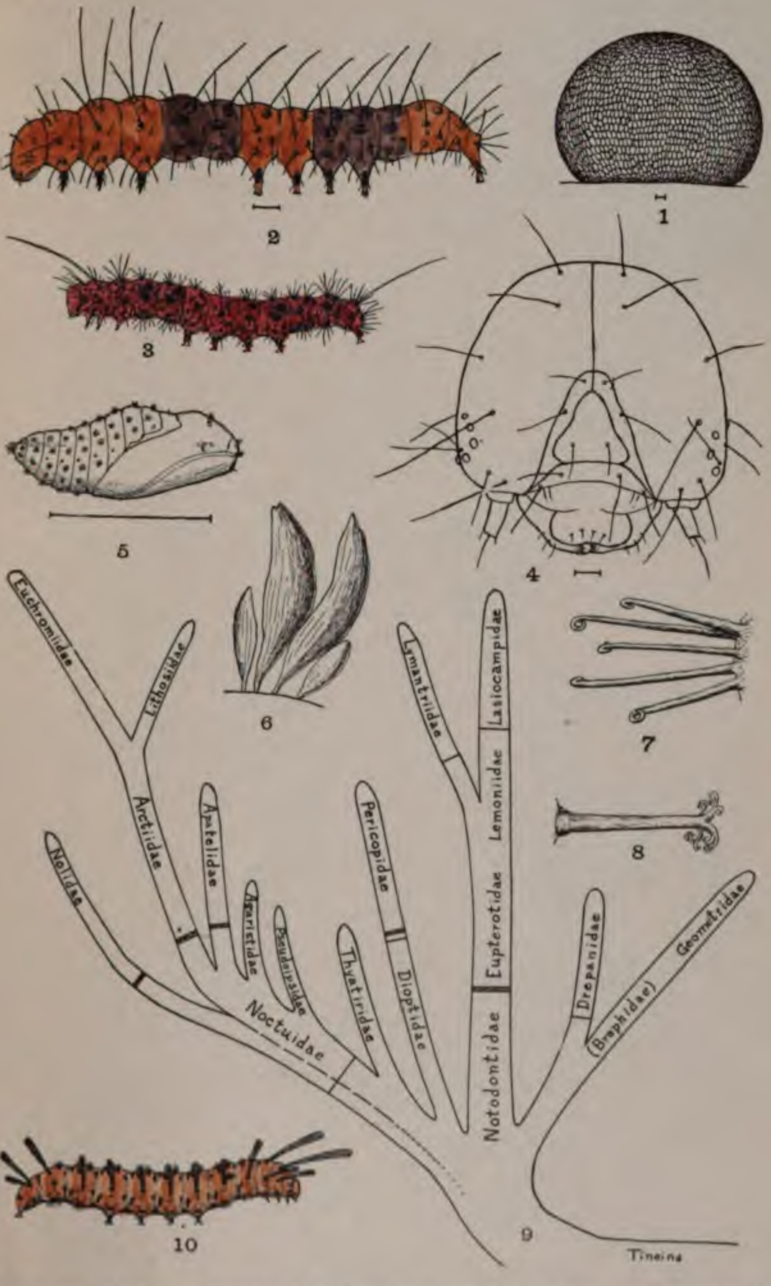
Tortricidia pallida, life-history of 167
Tragidion, food of, 76
Tragosoma harrisii, 74
Trichomelia parima, sp. nov., 151
  placida, sp. nov., 151
Trichromia pandera, sp. nov., 137
Trochuda impura, sp. nov., 58
Tylonotus bimaculatus, 75
Typocerus zebratus, 77
Urographus, food of 79
Vanessa antiopa, 109
Wickham, H. F., articles by, 33, 118
Webster, F. M., articles by, 67
Xylotrechus, food of, 76
Yuccaborus, larva of, 123
Zagymnus clerinus, 77
Zanoda, gen. nov., 150
  dives, sp. nov., 150
  fasciata, sp. nov., 150
Zilla californica, sp. nov., 90
Zygogramma, synopsis of, 196



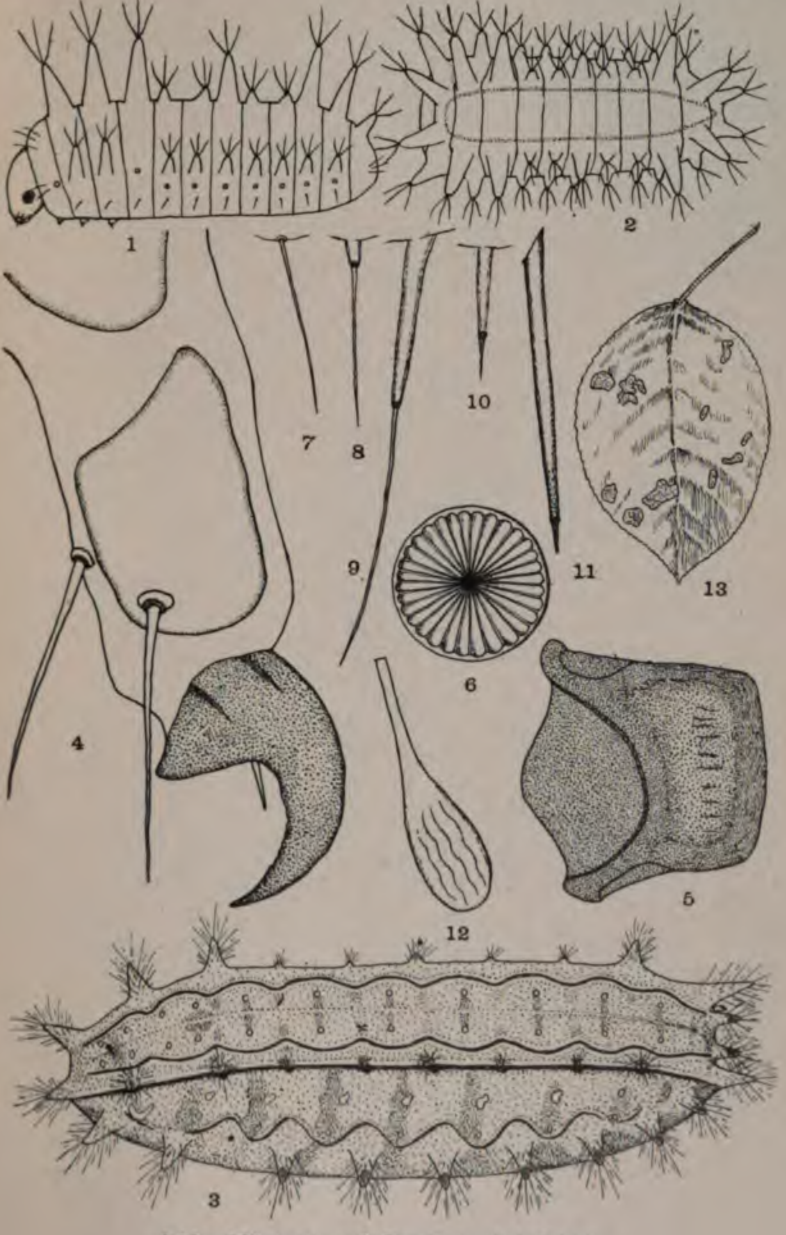
Life-History of Sibine stimulea.



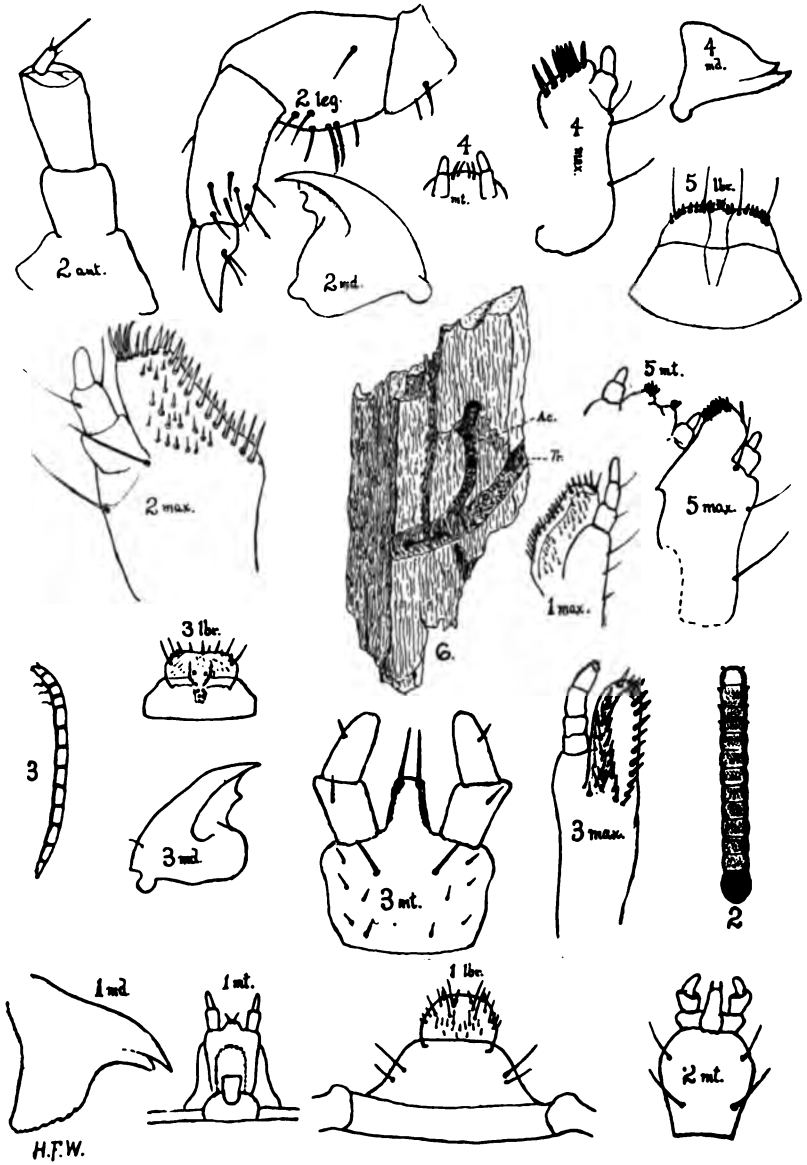
North American Tettiginæ.



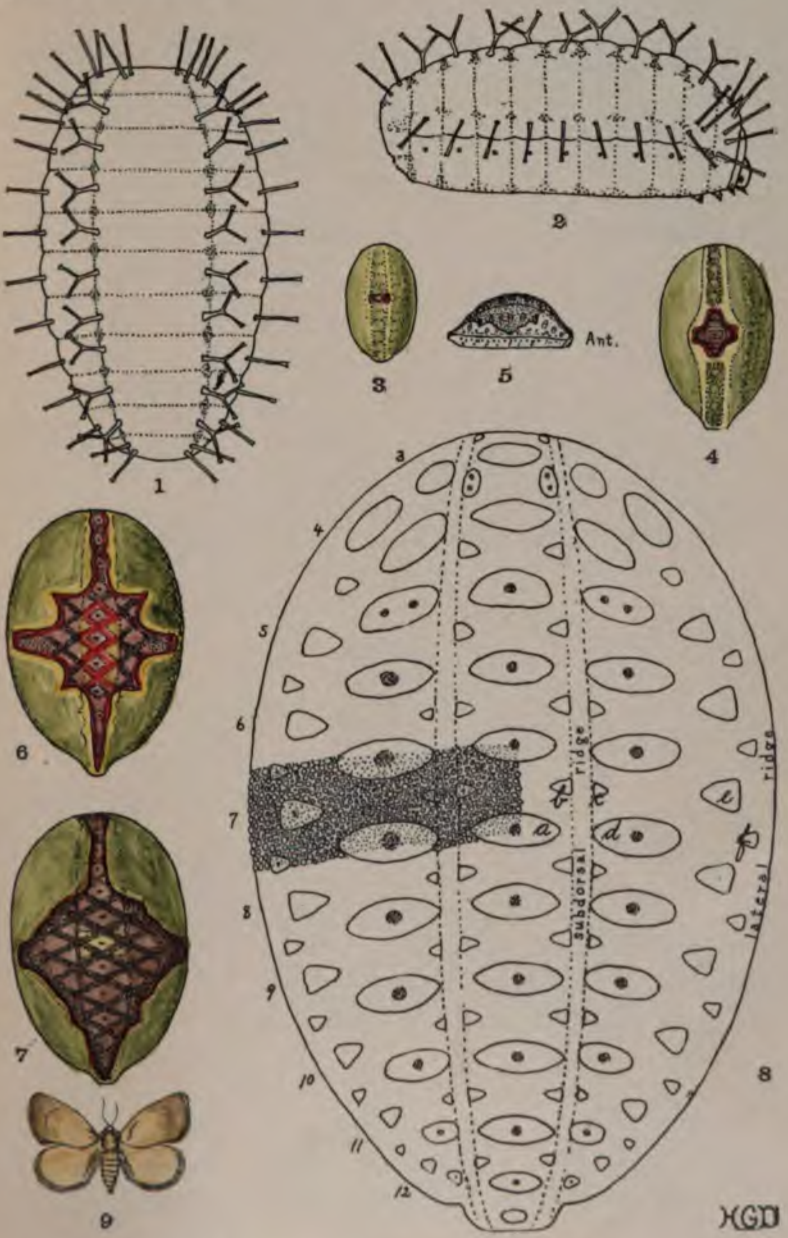
Larvæ of Composia fidelissima and Syntomeida epilais.



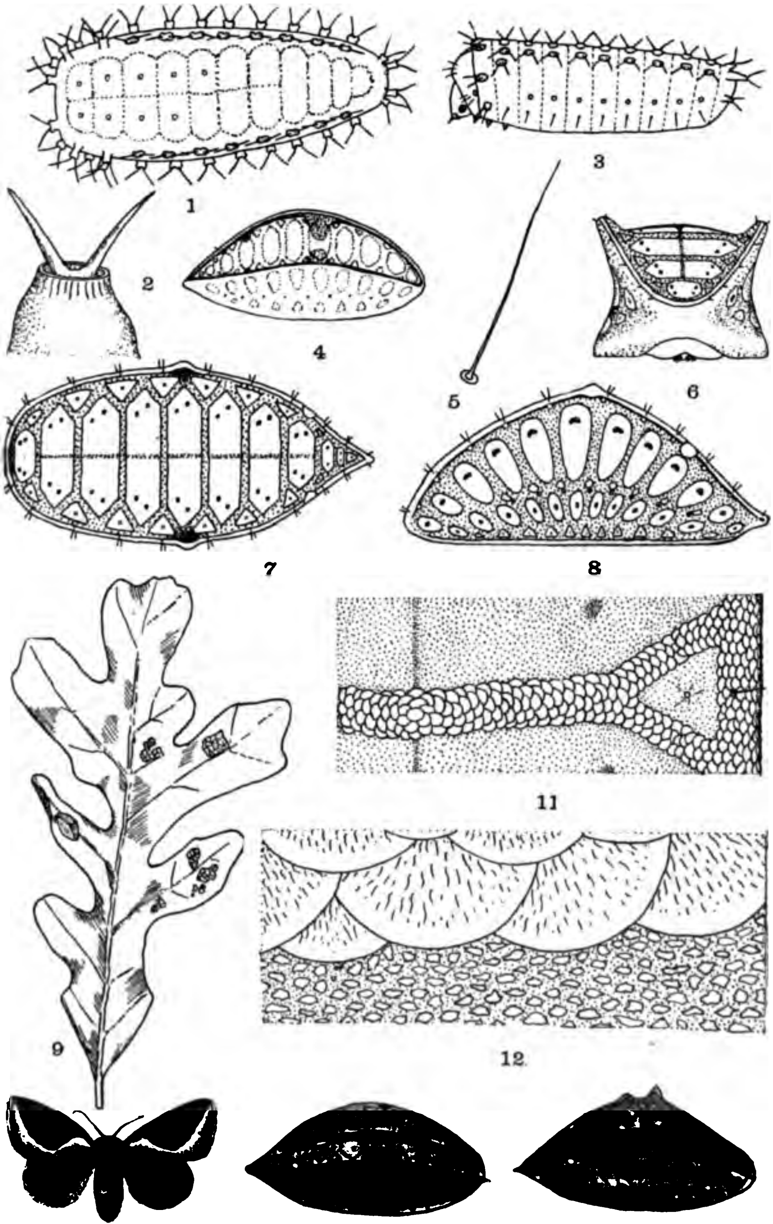
Life-History of Euclea delphinii.



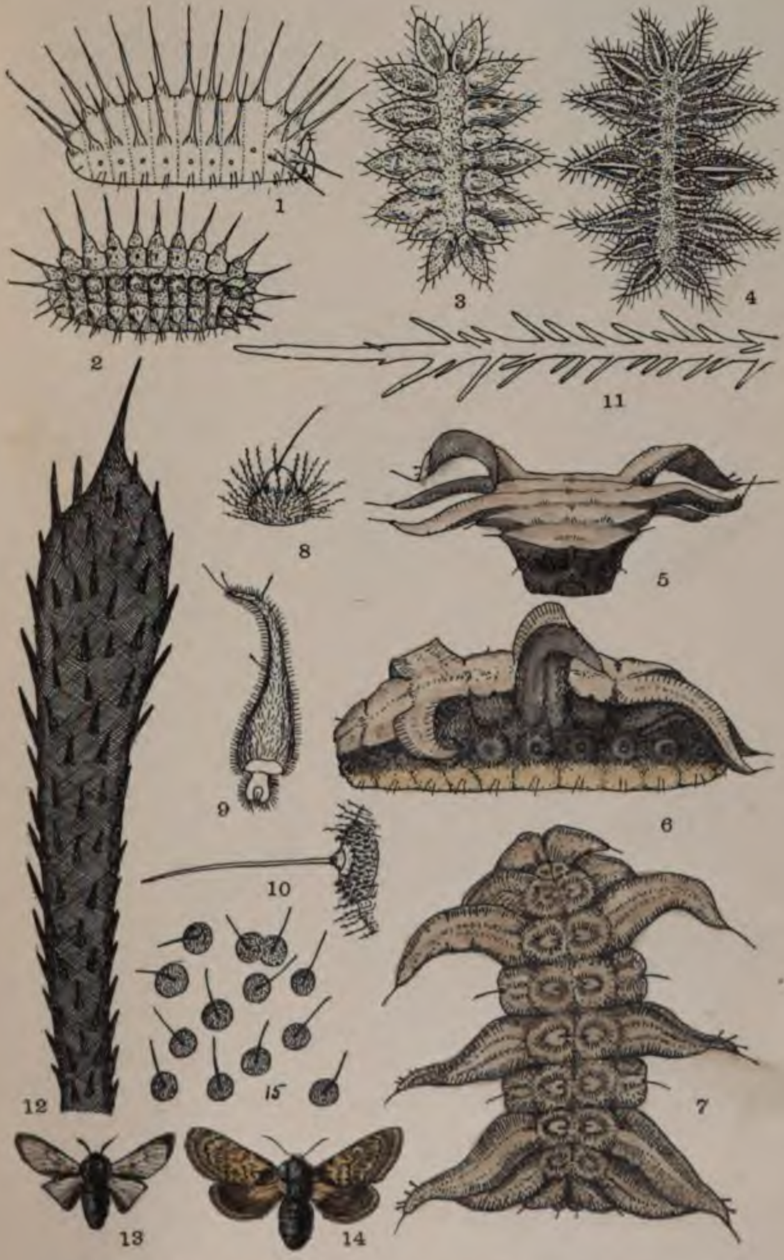
Coleopterous Larvæ.



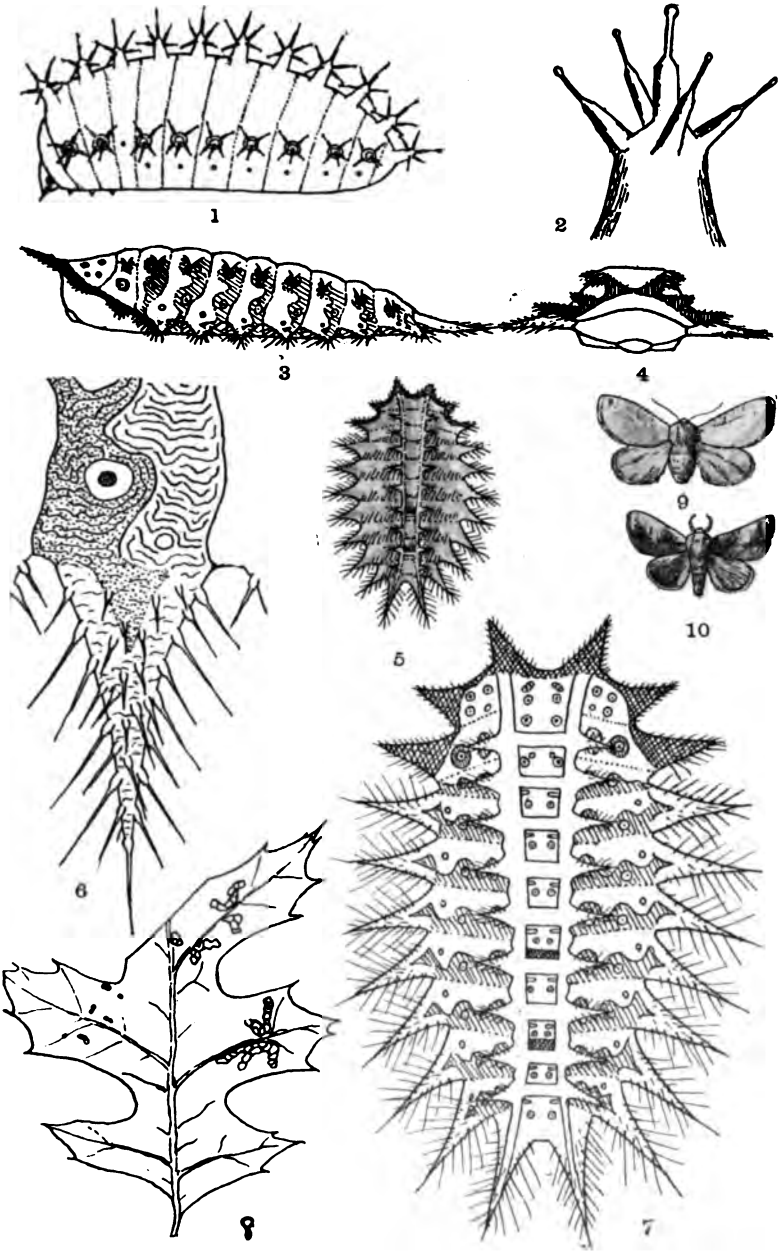
Life-History of Tortricidia pallida.



Life-History of Eulimacodes scapha.



Life-History of Phobetron pithecium.



Life-History of Sisyrosea textula.

1182

1895

VOL. III. NO. 1.

JOURNAL OF THE NEW YORK Entomological Society.

Devoted to Entomology in General.

MARCH, 1895.

Edited by WM. BEUTENMULLER.

Published Quarterly for the Society.

NEW YORK.

1895.

CONTENTS.

PAGE.
Notes on the Pseudoscorpionida. By NATHAN BANKS. 1
New North American Tettiginæ. I. By ALBERT P. MORSE, ... 14
A Combination of two Classifications of Lepidoptera. BY HARRISON G. DYAR. . 17
Life-History of Heterocampa obliqua. By A. S. PACKARD. 27
A Clew to the Origin of the Geometrid Moths. By A. S. PACKARD. 30
Domed Burrows of Cicada septendecim. By BENJAMIN LANDER. 33

Local Entomological Notes:

The Odonata of New York State. By PHILIP P. CALVERT. 39

JOURNAL

OF THE

New York Entomological Society.

Published quarterly by the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the journal should be sent to the Editor Wm. Beutenmüller, 931 Park Ave., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St. New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies 50 cents. Money Orders should be made payable at Station H.

SPECIAL NOTICE.

All subscribers to Volume III. of the JOURNAL are requested to promptly remit their annual subscription now due, to the Treasurer, C. F. GROTH, 139 E. 40th ST., NEW YORK CITY. Money Orders should be made payable at Station H.

Those who have not a complete set of the JOURNAL, should obtain the wanting volumes now, as only a limited number of copies are left over.

THE
NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to Mr. C. F. GROTH, Treasurer, 139 E. 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE, - - 28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM, - - - 172 E. 64th St., New York.
Treasurer, C. F. GROTH, - - - 139 E. 40th St., New York.
Rec. Secretary, L. H. JOUTEL, - - - 164 E. 117th St., New York.
Cor. Secretary, RAYMOND L. DITMARS, 43d St. and 12th Ave., West Brooklyn, N. Y.

EXECUTIVE COMMITTEE.

Ottomar Dietz, G. W. J. Angell, Gustav Beyer,
R. Ottolengui, C. Schaeffer.

PUBLICATION COMMITTEE.

E. Daecke, F. Rabe, L. H. Joutel,
Wm. Beutenmüller.

FIELD COMMITTEE.

L. T. Münch, Julius Meitzen.

LIST OF MEMBERS.

Aich, Herrman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Bornhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Loos, Herrman,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Riederer, Ludwig,
Rix, Gustav,
Rosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Schumacher, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Vaughan, C. W.,
Zabriskie, Rev. J. L.

JOHN AKHURST,

Taxidermist and Dealer in Entomological Supplies,

Imported Entomological Forceps.

Fine Carlsbader Insect Pins a specialty. Price-List sent on application.

78 Ashland Place,
Brooklyn, N. Y.

A. SMITH & SONS, 269 Pearl Street, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

JOINTED FOLDING NET

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. **Send for List.**

Dr. Staudinger & Bang-Haas, Blasewitz-Dresden,

in their new Price List, No. XXXVII, offer more than 12,500 species of well-named LEPIDOPTERA, set or in papers, from all parts of the world, in finest condition; 1000 kinds of PREPARED LARVÆ; numerous LIVING PUPÆ, &c. Separate Price Lists X and XI for COLEOPTERA (15,000 species); List II for HYMENOPTERA (1400 species), DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (300), NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

VOL. III. No. 2.

JOURNAL

OF THE

NEW YORK

Entomological Society.

Devoted to Entomology in General.

JUNE, 1895.

[illegible]

Published Quarterly for the Society

NEW YORK.

CONTENTS.

PAGE
Notes and Descriptions of Tachinidæ. By D. W. Coquillett, 49
A Variety of the Larva of Sphinx Plebeius. By Wm. Beutenmuller, 59
Notes on Two Callimorphas. By Harrison G. Dyar, 59
On the Food-Habits of Certain Dung and Carrion Beetles. By Charles Upson Clark, 61
Notes on a Collecting Tour in Connecticut. By R. L. Ditmars, 62
Two California Phalangids. By Nathan Banks, 66
Notes on Drepanid Larvæ. By Harrison G. Dyar, 66
On the Larvæ of the Hepialidæ. By A. S. Packard, 69
Preliminary Hand-Book of the Coleoptera of Northeastern America. By Charles W. Leng and Wm. Beutenmuller, 73

Local Entomological Notes:

A List of Spiders of Long Island, with Descriptions of New Species. By Nathan Banks, 76
Proceedings of the New York Entomological Society, 93

JOURNAL

OF THE

New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the JOURNAL should be sent to the editor, Wm. Beutenmüller, 931 Park Ave., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St., New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies, 50 cents. Money Orders should be made payable at Station H.

SPECIAL NOTICE.

All subscribers to Volume III of the JOURNAL are requested to promptly remit their annual subscription, now due, to the Treasurer, C. F. GROTH, 139 East 40th St., New York City. Money Orders should be made payable at Station H.

Those who have not a complete set of the JOURNAL should obtain the wanting volumes now, as only a limited number of copies are left over.

THE
NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE,	28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM,	172 East 64th Street, New York.
Treasurer, C. F. GROTH,	139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL,	164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS,	1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

OTTOMAR DIETZ, G. W. J. ANGELL, GUSTAV BEYER,
R. OTTOLENGUI, C. SCHAEFFER.

PUBLICATION COMMITTEE.

E. DAECKE, F. RABE, L. H. JOUTEL,
WM. BEUTENMULLER.

FIELD COMMITTEE.

L. T. MUNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Bornhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Lues, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Riederer, Ludwig,
Rix, Gustav,
Roosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Sellielt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST.

Taxidermist and Dealer in Entomological Supplies.

Improved Entomological Forceps.

Fine Carlsbader Insect Pins a specialty. Price-List sent on application.

78 Ashland Place,
Brooklyn, N. Y.

A. SMITH & SONS, 269 Pearl Street. New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

JOINTED FOLDING NET

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. **Send for List.**

Dr. Staudinger & Bang-Haas, Blasewitz-Dresden,

in their new Price-List, No. XXXVII, offer more than 12,500 species of well-named LEPIDOPTERA, set or in papers, from all parts of the world, in finest condition; 1000 kinds of PREPARED LARVÆ; numerous LIVING PUPÆ, &c. Separate Price-Lists X and XI for COLEOPTERA (15,000 species); List II for HYMENOPTERA (1400 species), DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (300), NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

DEC
LIBRARY

Vol. III. No. 3.

JOURNAL

OF THE

NEW YORK
Entomological Society.

Devoted to Entomology in General.

SEPTEMBER, 1895.

Edited by William Beutenmüller.

Published Quarterly for the Society.

NEW YORK.
1895.

[illegible]

CONTENTS.

PAGE
New Genera and Species of Tachinidæ. BY D. W. COQUILLETT, 97
New North American Tettiginæ. BY ALBERT P. MORSE, 107
The Eversible Repugnatorial Scent Glands of Insects. BY A. S. PACKARD, 110
Some Acarians from a Sphagnum Swamp. BY NATHAN BANKS, 128
Larva of Demas propinquilinea; its Systematic Position. BY HARRISON G. DYAR, 130
Note on Smerinthinæ. BY A. RADCLIFFE GROTE, 132
On the Correlation of Habits in Nemocerous and Brachycerous Diptera between Aquatic Larvæ and Blood-Sucking Adult Females. BY C. H. TYLER TOWNSEND, 134
Descriptions of the Preparatory Stages of Ennomos alniaria (*Linn*). BY WM. BEUTENMULLER, 137
Note on Hyperchiria io var. lilith. BY WM. BEUTENMULLER, 138
The Earth Worm as a Tree Planter. BY F. M. WEBSTER 139

Local Entomological Notes:

Insects at Watchogue and Beulah Land, Staten Island, N. Y. BY WM. T. DAVIS, 140
Proceedings of the New York Entomological Society, 144

JOURNAL
OF THE
New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the JOURNAL should be sent to the editor, Wm. Beutenmüller, 931 Park Ave., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St., New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies, 50 cents. Money Orders should be made payable at Station H.

SPECIAL NOTICE.

All subscribers to Volume III of the JOURNAL are requested to promptly remit their annual subscription to the Treasurer, C. F. GROTH, 139 East 40th St., New York City. Money Orders should be made payable at Station H.

Those who have not a complete set of the JOURNAL should obtain the wanting volumes now, as only a limited number of copies are left over.

THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE, ... 28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM, ... 172 East 64th Street, New York.
Treasurer, C. F. GROTH, ... 139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL, ... 164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS, . . . 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

OTTOMAR DIETZ, G. W. J. ANGELL, GUSTAV BEYER,
R. OTTOLENGUI, C. SCHAEFFER.

PUBLICATION COMMITTEE.

E. DAECKE, F. RABE, L. H. JOUTEL,
WM. BEUTENMÜLLER,

FIELD COMMITTEE.

L. T. MÜNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Bornhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Langmann, Dr. F.,
Loos, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Ray, David H.,
Riederer, Ludwig,
Roosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST,

Taxidermist and Dealer in Entomological Supplies,

Fine Carlsbader Insect Pins a specialty. Price-List sent on application.

78 Ashland Place,
Brooklyn, N. Y.

Imported Entomological Forceps.

A. SMITH & SONS, 269 Pearl Street, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. Send for List.

JOINTED FOLDING NET

Dr. Staudinger & Bang-Haas, Blasewitz-Dresden,

in their new Price List, No. XXXVII, offer more than 12,500 species of well-named LEPIDOPTERA, set or in papers, from all parts of the world, in finest condition; 1000 kinds of PREPARED LARVÆ; numerous LIVING PUPÆ, &c. Separate Price Lists X and XI for COLEOPTERA (15,000 species); List II for HYMENOPTERA (1400 species), DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (300), NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

Vol. III. No. 2.

JOURNAL

OF THE

NEW YORK

Entomological Society.

Devoted to Entomology in General.

JUNE, 1895.

Edited by William Beutenmüller.

Published Quarterly for the Society.

NEW YORK.

1895.

[illegible]

CONTENTS.

Pa
Notes and Descriptions of Tachinidæ. By D. W. Coquillett, 4
A Variety of the Larva of Sphinx Plebeius. By Wm. Beutenmuller, 5
Notes on Two Callimorphas. By Harrison G. Dyar, 5
On the Food-Habits of Certain Dung and Carrion Beetles. By Charles U
Clark, 6
Notes on a Collecting Tour in Connecticut. By R. L. Ditmars, 6
Two California Phalangids. By Nathan Banks, 6
Notes on Drepanid Larvæ. By Harrison G. Dyar,
On the Larvæ of the Hepialidæ. By A. S. Packard,
Preliminary Hand-Book of the Coleoptera of Northeastern America. By Charles
W. Leng and Wm. Beutenmuller, 7
Local Entomological Notes:
A List of Spiders of Long Island, with Descriptions of New Species. By Nathan
Banks, 7
Proceedings of the New York Entomological Society, 9

JOURNAL

OF THE

New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages pe
volume, with as many plates as possible. All communications relating to th
Journal should be sent to the editor, Wm. Beutenmüller, 931 Park Ave.
and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St
New York City. Terms for subscription, $2.00 per year, strictly in ad
vance. Single copies, 50 cents. Money Orders should be made payabl
at Station H.

THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE, 28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM, 172 East 64th Street, New York.
Treasurer, C. F. GROTH, 139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL, 164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS, 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

OTTOMAR DIETZ, G. W. J. ANGELL, GUSTAV BEYER,
R. OTTOLENGUI, C. SCHAEFFER.

PUBLICATION COMMITTEE.

E. DAECKE, F. RABE, L. H. JOUTEL,
WM. BEUTENMÜLLER,

FIELD COMMITTEE.

L. T. MÜNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Bornhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil F.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Loos, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Riederer, Ludwig,
Rix, Gustav,
Rosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST.

Taxidermist and Dealer in Entomological Supplies.

Fine Carlsbader I
Pins a specialty. I
List sent on applic

78 Ashland Pl
Brooklyn, N. Y

Improv d Entomological Forceps.

A. SMITH & SONS, 269 Pearl Street, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGIST

Klaeger and Carlsbad Insect Pins, Set
Boards, Folding Nets, Locality ar
Special Labels, Forceps, Sheet Cork,
Other articles are being added. Send for

JOINTED
FOLDING NET

Dr. Staudinger & Bang-Haas, Blasewitz-Dresd

in their new Price-List, No. XXXVII, offer more than 12,500 sp
of well-named LEPIDOPTERA, set or in papers, from all parts o
world, in finest condition; 1000 kinds of PREPARED LARVÆ; nu
ous LIVING PUPÆ, &c. Separate Price-Lists X and XI for COLE
TERA (15,000 species); List II for HYMENOPTERA (1400 spe
DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (
NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

Vol. III. No. 3.

JOURNAL

OF THE

NEW YORK Entomological Society.

Devoted to Entomology in General.

SEPTEMBER, 1895.

Edited by WILLIAM BEUTENMÜLLER.

Published Quarterly for the Society.

NEW YORK.
1895.

[illegible]

CONTENTS.

Page
New Genera and Species of Tachinidæ. By D. W. Coquillett, 97
New North American Tettiginæ. By Albert P. Morse, 107
The Eversible Repugnatorial Scent Glands of Insects. By A. S. Packard, 110
Some Acarians from a Sphagnum Swamp. By Nathan Banks, 125
Larva of Demas propinquilinea; its Systematic Position. By Harrison G. Dyar, 130
Note on Smerinthinæ. By A. Radcliffe Grote, 133
On the Correlation of Habits in Nemoscerous and Brachycerous Diptera between Aquatic Larvæ and Blood-Sucking Adult Females. By C. H. Tyler Townsend, 134
Descriptions of the Preparatory Stages of Ennomos alniaria (*Linn*). By Wm. Beutenmuller, 137
Note on Hyperchiria io var. lilith. By Wm. Beutenmuller, 138
The Earth Worm as a Tree Planter. By F. M. Webster 139
Local Entomological Notes:
Insects at Watchogue and Beulah Land, Staten Island, N. Y. By Wm. T. Davis, 140
Proceedings of the New York Entomological Society, 144

JOURNAL
OF THE
New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the Journal should be sent to the editor, Wm. Beutenmüller, 931 Park Ave., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St., New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies, 50 cents. Money Orders should be made payable

THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE, ... 28 Regent Place, Flatbush, Brooklyn.
Vice President, CHAS. PALM, ... 172 East 64th Street, New York,
Treasurer, C. F. GROTH, ... 139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL, . 164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS, . 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

OTTOMAR DIETZ, G. W. J. ANGELL, GUSTAV BEYER,
R. OTTOLENGUI, C. SCHAEFFER.

PUBLICATION COMMITTEE.

E. DAECKE, F. RABE, L. H. JOUTEL,
WM. BEUTENMULLER,

FIELD COMMITTEE.

L. T. MÜNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Bornhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Langmann, Dr. F.,
Loos, Herman,
Love, Dr. E. G.,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Ray, David H.,
Riederer, Ludwig,
Rosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST.

Taxidermist and Dealer in Entomological Supplies.

Fine Carlsbader
Pins a specialty.
List sent on applic

Improved Entomological Forceps.

78 Ashland P
Brooklyn, N.

A. SMITH & SONS. 269 Pearl Street. New York

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGIS

JOINTED
FOLDING NET

Klaeger and Carlsbad Insect Pins, Se
Boards, Folding Nets, Locality a
Special Labels, Forceps, Sheet Cork,
Other articles are being added. Send fo

Dr. Staudinger & Bang-Haas, Blasewitz-Dres

in their new Price-List, No. XXXVII, offer more than 12,500
of well-named LEPIDOPTERA, set or in papers, from all parts
world, in finest condition; 1000 kinds of PREPARED LARVÆ; n
ous LIVING PUPÆ, &c. Separate Price-Lists X and XI for COL
TERA (15,000 species); List II for HYMENOPTERA (1400 sp
DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (
NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

Dept Ent

VOL. III. No. 4.

JOURNAL

OF THE

NEW YORK Entomological Society.

Devoted to Entomology in General.

DECEMBER, 1895.

Edited by WILLIAM BEUTENMÜLLER.

Published Quarterly for the Society.

NEW YORK.
1895.

[illegible]

CONTENTS.

Page
The Life Histories of the New York Slug Caterpillars. By Harrison G. Dyar and Miss Emily L. Morton, ... 145
On the Probable Origin, Development, and Diffusion of North American Species of the Genus Diabrotica. By F. M. Webster, . . 158
Final Note on the Platypterygidæ. By A. Radcliffe Grote, . . . 166
A New Datana. By Harrison G. Dyar, ... 167
Schrank's Genera. By A. Radcliffe Grote, ... 168
Early Stages of Some Bombycine Caterpillars. By A. S. Packard, . . 175
Preliminary Hand-Book of the Coleoptera of North-eastern America. By H. F. Wickham (*to be continued*), ... 180
Correction of a Misidentification of Attacus Splendidus. By Harrison G. Dyar, 191
Local Entomological Notes, ... 192
Egg Capsules of Chrysochus Auratus. By J. L. Zabriskie, ... 192

JOURNAL

OF THE

New York Entomological Society.

THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00; Associate Members, $2.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1895.

President, J. L. ZABRISKIE, ... 28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM, ... 172 East 64th Street, New York.
Treasurer, C. F. GROTH, ... 139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL, ... 164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS, . . . 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

OTTOMAR DIETZ, G. W. J. ANGELL, GUSTAV BEYER,
R. OTTOLENGUI, C. SCHAEFFER.

PUBLICATION COMMITTEE.

E. DAECKE, F. RABE, L. H. JOUTEL,
WM. BEUTENMÜLLER,

FIELD COMMITTEE.

L. T. MÜNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Afflehin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutenmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Barnhagen, H.,
Burchell, James,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hulst, Rev. G. D.,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Küchler, F.,
Langmann, Dr. F.,
Loos, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Mohns, Julius,
Münch, Louis T.,
Ottolengui, Dr. R.,
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Ray, David H.,
Riederer, Ludwig,
Rosevelt, Warren G.,
Schaeffer, C.,
Sass, C. W.,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Smith, Arthur,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST,

Taxidermist and Dealer in Entomological Supplies.

Improved Entomological Forceps.

Fine Carlsbader Insect Pins a specialty. Price-List sent on application.

78 Ashland Place,
Brooklyn, N. Y.

A. SMITH & SONS, 269 Pearl Street, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

JOINTED FOLDING NET

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. Send for List.

Dr. Staudinger & Bang-Haas, Blasewitz-Dresden,

in their new Price-List No. XXXVII, offer more than

Liq'd Ent

VOL. IV. No. 1.

JOURNAL
OF THE
NEW YORK
Entomological Society.

Devoted to Entomology in General.

MARCH, 1896.

Published Quarterly for the Society.

NEW YORK.
1896.

Entered [illegible] N. Y. [illegible]

CONTENTS.

PAGE

The Life Histories of the New York Slug Caterpillars. By HARRISON G. DYAR and MISS EMILY L. MORTON, ... 1

Synopsis of the Species of Nysson Inhabiting America, North of Mexico. By WILLIAM J. FOX, ... 10

Some Notes on Locust Stridulation. By A. P. MORSE, ... 16

Both Sides of Butterflies. By A. P. MORSE, ... 20

A New Gloveria. By HARRISON G. DYAR, ... 22

Literature on Defensive or Repugnatorial Glands of Insects. By A. S. PACKARD, . 26

Preliminary Hand-Book of the Coleoptera of North-eastern America. By H. F. WICKHAM, ... 33

Illustrations of North American Tettiginæ. By A. P. MORSE, ... 45

Proceedings of the New York Entomological Society, ... 50

JOURNAL

OF THE

New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the JOURNAL should be sent to the editor, Wm. Beutenmüller, 931 Park Ave., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St., New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies, 50 cents. Money Orders should be made payable at Station H.

THE

NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00; Associate Members, $2.00.

Members of the Society will please remit their annual dues, payable in January, to MR. C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1896.

President, J. L. ZABRISKIE, ... 28 Regent Place, Flatbush, Brooklyn.
Vice-President, CHAS. PALM, ... 172 East 64th Street, New York.
Treasurer, C. F. GROTH, ... 139 East 40th Street, New York.
Rec. Secretary, L. H. JOUTEL, ... 164 East 117th Street, New York.
Cor. Secretary, RAYMOND L. DITMARS, . . . 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

J. L. ZABRISKIE,
OTTOMAR DIETZ,
C. F. GROTH.
E. G. LOVE,
H. G. DYAR.

PUBLICATION COMMITTEE.

E. DAECKE,
C. SCHAEFFER,
L. H. JOUTEL.
WM. BEUTENMÜLLER,

FIELD COMMITTEE.

L. T. MÜNCH,
JULIUS MEITZEN.

LIST OF MEMBERS.

Aich, Herman,
Allchin, Harry,
Angell, G. W. J.,
Bennett, Henry C.,
Beutentmüller, Wm.,
Beyer, Gustav,
Bird, Henry,
Birnbaum, Martin,
Bornhagen, H.,
Clarkson, Frederick,
Daecke, E.,
Dietz, Ottomar,
Ditmars, Raymond L.,
Doll, Jacob,
Dyar, Harrison G.,
Fayen, Emil E.,
Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hug, Herman,
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Küchler, F.,
Langmann, Dr. G.,
Loos, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Moschell, Mrs. L.,
Münch, Louis T.,
Ottolengui, Dr. R..
Palm, Charles,
Prime, Dr. Wm. C.,
Rabe, Franz,
Riederer, Ludwig,
Schaeffer, C.,
Sass, C. W,
Shoemaker, Ernest,
Schuyler, Montgomery,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

ber of the JOURNAL is expected to be held **April 22, 1896, at**
Many rare species have since been added. Send for list, to be h
the Editor, who will also furnish further particulars concerning the

---

JOHN AKHURST.

Taxidermist and Dealer in Entomological Supplie

Improved Entomological Forceps.

Fine Carlsbad
Pins a specialty.
List sent on app

78 Ashland
Brooklyn, N.

A. SMITH & SONS, 269 Pearl Street, New Yor

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGI

Klaeger and Carlsbad Insect Pins, S
Boards, Folding Nets, Locality
Special Labels, Forceps, Sheet Cor
Other articles are being added. Send

Dr. Staudinger & Bang-Haas, Blasewitz-Dre

in their new Price-List, No. XXXVII, offer more than 12,50
of well-named LEPIDOPTERA, set or in papers, from all part
world, in finest condition; 1000 kinds of PREPARED LARVÆ;
ous LIVING PUPÆ, &c. Separate Price-Lists X and XI for CO
TERA (15,000 species); List II for HYMENOPTERA (1400 s

Vol. IV. No. 2.

JOURNAL

OF THE

NEW YORK

Entomological Society.

Devoted to Entomology in General.

JUNE, 1896.

Edited by William Beutenmüller.

Published Quarterly for the Society.

NEW YORK.
1896.

Entered as second-class matter at the New York Post Office, June [illegible], [illegible]

[illegible], Lancaster, Pa.

CONTENTS.

Page
New Species of Heterocera from Tropical America. By William Schaus, 147
Notes on the Transformations of the Higher Hymenoptera. By A. S. Packard, 153
A New Anisota. By Harrison G. Dyar, 166
The Life-Histories of the New York Slug Caterpillars, III.-VI. By Harrison G. Dyar, 167
Additions to the List of Long Island Spiders. By Nathan Banks, 190
A New Species of Gomphus. By Nathan Banks, 193
A Short Review of the Chrysomelas of North America. By Martin L. Linell, 195
The Dog's Head Butterfly on Staten Island. By W. T. Davis, 200
Diabrotica in New Mexico. By T. D. A. Cockerell, 200
Note on Samia Californica. By A. R. Grote, 201
New Species of Insects Taken on a Trip from Mesilla Valley to the Sacramento Mts., New Mexico. By T. D. A. Cockerell, 201
Proceedings of the New York Entomological Society, 207

JOURNAL

OF THE

New York Entomological Society.

Published quarterly for the Society. Will contain about 200 pages per volume, with as many plates as possible. All communications relating to the Journal should be sent to the editor, Wm. Beutenmüller, 106 W. 133d St., and all subscriptions to the Treasurer, Mr. C. F. Groth, 139 East 40th St., New York City. Terms for subscription, $2.00 per year, strictly in advance. Single copies, 50 cents. ***Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY.*** Money orders should be made payable at Station H.

SPECIAL NOTICE.

All subscribers to Volume V, of the Journal are requested to promptly remit their annual subscription to the Treasurer, C. F. Groth, 139 East 40th St., New York City. Money orders should be made payable at Station H.

Those who have not a complete set of the Journal should obtain the wanting volumes now, as only a limited number of copies are left over.

THE

EW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each th (except July and August) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL TORY, 77th Street and Eighth Ave.

All interested in Entomology are cordially invited to attend.

Annual dues for Active Members, $3.00.

Members of the Society will please remit their annual dues, payable in January, to . C. F. GROTH, Treasurer, 139 East 40th Street, New York City.

Officers for the Year 1896.

sident, J. L. ZABRISKIE, ... 28 Regent Place, Flatbush, Brooklyn.
e-President, CHAS. PALM, ... 172 East 64th Street, New York.
asurer, C. F. GROTH, . . . 139 East 40th Street, New York.
. *Secretary*, L. H. JOUTEL, ... 164 East 117th Street, New York.
. *Secretary*, RAYMOND L. DITMARS, ... 1666 Bathgate Ave., New York.

EXECUTIVE COMMITTEE.

. ZABRISKIE, OTTOMAR DIETZ, C. F. GROTH.
E. G. LOVE, H. G. DYAR.

PUBLICATION COMMITTEE.

DAECKE, C. SCHAEFFER, L. H. JOUTEL.
WM. BEUTENMÜLLER,

FIELD COMMITTEE.

L. T. MÜNCH, JULIUS MEITZEN.

LIST OF MEMBERS.

h, Herman,
chin, Harry,
gell, G. W. J.,
nnett, Henry C.,
utenmüller, Wm.,
yer, Gustav,
d, Henry,
nbaum, Martin,
ckburn, C. V.,
nhagen, H.,
rkson, Frederick,
ecke, E.,
tz, Ottomar,
mars, Raymond L.,
ll, Jacob,
ar, Harrison G.,
en, Emil E.,

Fillion, Francis,
Gallatin, J. M.,
Groth, Christian F.,
Havell, G. H.,
Hug, Herman,.
Joutel, Louis H.,
Kretz, Dr. F. H.,
Kudlich, Dr. H. F.,
Küchler, F.,
Langmann, Dr. G.,
Loos, Herrman,
Love, Dr. E. G.,
Meitzen, Julius,
Moschell, Mrs. L.,
Münch, Louis T.,
Ottolengui, Dr. R..
Palm, Charles,

Pike, Col. Nicholas,
Prime, Dr. Wm. C.,
Rabe, Franz,
Riederer, Ludwig,
Schaeffer, C.,
Sass, C. W,
Shoemaker, Ernest,
Schaus, Wm.,
Seibelt, Otto,
Seifert, Dr. Otto,
Slosson, Mrs. A. T.,
Tunison, Chas.,
Uhlenhaut, F.,
Zabriskie, Rev. J. L.

JOHN AKHURST.

Taxidermist and Dealer in Entomological Supplies.

Improved Entomological Forceps.

Fine Carlsbader Insect Pins a specialty. Price-List sent on application.

78 Ashland Place,
Brooklyn, N. Y.

A. SMITH & SONS, 269 Pearl Street, New York.

MANUFACTURERS AND IMPORTERS OF

GOODS FOR ENTOMOLOGISTS,

Klaeger and Carlsbad Insect Pins, Setting Boards, Folding Nets, Locality and Special Labels, Forceps, Sheet Cork, Etc. Other articles are being added. **Send for List.**

Dr. Staudinger & Bang-Haas, Blasewitz-Dresden,

in their new Price-List, No. XXXVII, offer more than 12,500 species of well-named LEPIDOPTERA, set or in papers, from all parts of the world, in finest condition; 1000 kinds of PREPARED LARVÆ; numerous LIVING PUPÆ, &c. Separate Price-Lists X and XI for COLEOPTERA (15,000 species); List II for HYMENOPTERA (1400 species), DIPTERA (550), HEMIPTERA (1000), ORTHOPTERA (300), NEUROPTERA (250). List VI and VII for SHELLS.

DISCOUNT FOR CASH ORDERS.

For
Use in LIBRARY
ONLY
DO NOT REMOVE
FROM LIBRARY

595.706
N532

To avoid fine, this book should be returned on
or before the date last stamped below

F MAY 11 '[illegible]

9